FNI Report 9/2015

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Waves, Design and Diffusion

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Jorgen.Wettestad@fni.no and Lars.Gulbrandsen@fni.no

September 2015

FRIDTJOF NANSENS INSTITUTT
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Title

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Publication Type and Number

FNI Report 9/2015

Pages

40

Authors

Jørgen Wettestad and
Lars H. Gulbrandsen

ISBN
978-82-7613-702-6

ISSN 1893-5486

Abstract

For proponents of the view that the introduction of carbon pricing globally should be a key response to the serious climate change challenge, the post-2010 phase has been a bit mixed. The EU, the emissions trading frontrunner, has experienced increasing trouble. Still, around the globe, a number of other emissions trading systems have started operating. Not least the problems experienced by the EU ETS have put the spotlight on the design question: how to design systems that produce a stable and reasonably high carbon price while interacting well with other policy instruments. Furthermore, as systems develop at different speeds and with differing design properties, interaction between the systems becomes a pertinent topic, linking up to the long and rich debate in political science about policy diffusion. This report examines the evolving design properties of the EU ETS and emissions trading systems in Australia, California and China, and takes stock of knowledge regarding the role of policy diffusion in shaping these systems. Australia is an interesting case of a proposed system that collapsed under intense domestic political-economic pressures. California is significant as a case of political leadership in the USA. The establishment of seven sub-national pilot systems in China, the world's biggest greenhouse gas emitter, is potentially of great importance. On the basis of these examinations, the report identifies important gaps in existing knowledge on the role of policy diffusion and contributes to the research agenda in this area.

Key Words

Australia, California, China, design, emissions trading, EU, policy diffusion

Contents

Acknowledgments

We would like to thank the following persons for useful comments to a draft version of this report: Steinar Andresen, Ian Bailey, Goerild Heggelund, Tor Håkon Inderberg, Torbjørg Jevnaker, Brendan Moore, Knut Einar Rosendahl , Iselin Stensdal, Endre Tvinnereim, Arild Underdal and David G. Victor. In addition, we received useful comments from Lada Kochtcheeva and the general discussion at a panel on carbon market politics at the ISA Conference, New Orleans, February 2015. Our thanks also to Susan Høivik for language polishing.

Lysaker, September 2015

Jørgen Wettestad and Lars H. Gulbrandsen

Note:

For information about the ongoing research project 'Designing Effective Emissions Trading: The Role of International Diffusion'. See www.fni.no/projects/ets-diffusion.html

1 Introduction

For proponents of the view that the introduction of carbon pricing on a global scale should be a key response to the climate-change challenge, the post-2010 era has been somewhat mixed, but with several promising developments (see Mehling 2012; Calel 2013; IETA 2014: World Bank 2014; ICAP 2015). The key international frontrunner in this area, the EU, has experienced increasing problems, with a growing surplus of allowances and a low carbon price, caused not least by recessionary pressures. The growth of renewables has further lowered demand for allowances, highlighting problematic interactions with other policy instruments. Around the globe, other significant systems have started operating, like that in California, which covers the world's ninth biggest economy. Of particular interest and importance is the turn to emissions trading ET) in China, the world's biggest greenhouse gas (GHG) emitter (some 10 billion tons CO2 per year), where seven sub-national pilot systems have been established. There are also interesting developments elsewhere – as with smaller systems established in countries as diverse as Kazakhstan and Switzerland; the South Korean ETS established in 2015; and countries such as Brazil and Mexico considering the introduction of emissions trading (see e.g. ICAP 2015).

The problems experienced by the EU Emissions Trading System (EU ETS) have put the spotlight on the question of design: how to design systems that produce a stable and reasonably high carbon price and interact well with other policy instruments in fulfilling the overriding goal of achieving emissions reductions in a cost-effective way (see Klinsky et al. 2012). Most research has focused on the diffusion of systems for emissions trading as such, and not on specific design characteristics (e.g. Betsill and Hoffman 2011; Meckling 2011; Paterson et al. 2014). Further, studies dealing with the spread of particular design features have focused on similarities across systems, not differences (Paterson et al. 2014).

As systems develop at different speeds, with frontrunners and more recent adopters, the question of interaction *between* the systems becomes increasingly pertinent. Such a focus on inter-system communication and learning creates natural links to rich and lengthy debates in political science on how to conceptualize and understand policy diffusion (e.g. Elkins and Simmons 2005; Börzel and Risse 2012; Shipan and Volden 2013).

In this report we begin with a brief chronological overview of the emergence of main carbon trading systems around the world, identifying four distinct phases or 'waves' (see Elkins and Simmons 2005).

Second, focusing particularly on the design of these systems, we provide an overview of main similarities and differences in the design of four selected systems: the EU ETS, California, Australia and China. We have selected these cases because they have been at the centre of different 'waves'; they represent countries or regions with big emissions, globally or regionally; there have been linking efforts between some of them (particularly EU and Australia); they exhibit interesting similarities and differences in design and implementation choices; and they can help us identify the importance of design choices and political context for the success of emissions trading – or, as in the case of Australia, (temporary) failure.

Third, as we are particularly interested in the role and explanatory power of inter-system policy diffusion, we sum up the main available knowledge on the role of such diffusion for shedding light on similarities and differences in design, roughly checked against internal, contextual shaping factors. This is a tall order and we cannot claim to provide a 'complete' overview.

Fourth, on the background of this analysis, we formulate some reflections on research tasks ahead and the more general implications for global climate politics. Do systems converge or diverge over time? Better knowledge can help us to assess the prospects for linked systems and an emerging future global climate regime 'from below' (see also Victor 2009; Green et al. 2014).

2 Studying the global diffusion of ET: key conceptual building blocks

If we take reports and articles published by the ‘project 88’ in the USA and by Michael Grubb in Europe in the 1980s as the start of serious discussions on the role of emissions trading in the development of international climate policy, then emissions trading in the context of climate change has emerged over a 25-year period (see Stavins 1988; Grubb 1989). The FNI-led research project on ETS DIFFUSION, with the present report as a core initial component, pays special attention to four actors that are quite different, in terms of economic development and political systems: the EU, California, Australia and China. To place the systems of these four actors in a broader historical context, we distinguish phases in the form of successive *waves* of diffusion (Huntington 1991; Elkins and Simmons 2005). The ‘wave’ metaphor is a helpful structuring device which can lead us to look for centres, and thereby key senders of policy signals about instruments, design options and functioning. From the very start, quite separate US and European centres could be distinguished (Paterson et al. 2013). Over time a more polycentric structure has evolved (see Ostrom 2010; Meckling 2011; Paterson et al. 2013; Calel 2013).

How to delineate the successive ETS waves in the context of climate change? The *first wave* was centred around the UN Framework Convention on Climate Change (UNFCCC) adopted in 1992 and the ensuing preparations for the Kyoto Protocol. This culminated in the adoption of the Protocol in 1997, with international emissions trading as one of three flexibility mechanisms. The initial key post-Kyoto event that marked the onset of the *second wave* was the initiation of EU emissions trading. Next, from 2004/5 on, increasing polycentrism brought a *third wave*, with sub-national systems appearing in the USA (like the Regional Greenhouse Gas Initiative and the Western Climate Initiative, including California), initiatives in Japan, New Zealand and Australia, and with EU ETS undergoing substantial revision. The *fourth wave* began in 2009/2010, with the emergence of a more advanced polycentric structure, marked by pilot systems being established in the world’s biggest emitter, China, but also with ET being taken up by a diverse group of actors, including Kazakhstan and South Korea, and the initiation of further reform of the EU ETS.

The principal research question of the ETS DIFFUSION project concerns the causal role of international diffusion in shaping the *properties of emissions-trading systems*. We pose this question because we think that those properties, in turn, influence whether an emissions-trading system is *effective* (resulting in significant reductions in GHG emissions) and *efficient* (achieving such reductions at minimal costs). Such systems can be classified according to various criteria – for recent overviews, see Weishaar (2014) and Van Asselt (forthcoming 2016). As further elaborated in Underdal et al. (2015), at least eight main design features can be distinguished:

- type of system, including the distinction between baseline-and-credit and cap-and-trade systems, the existence of intra-temporal safety valves (such as banking, i.e. saving allowances from one phase/period to another), and the governance level (e.g. national vs sub-national or supra-national systems);

- ambition level, concerning the level of the cap and emission cuts aimed for within a given period, and the possible specific role assigned to the ETS in achieving the target(s);
- sectors, gases and emissions covered, with a basic distinction between energy-producing and energy-consuming/energy-intensive sectors/industries; if only CO2 is covered or also other greenhouse gases; and if only 'direct emissions' (from production) are covered – or also 'indirect emissions' (from consumption of goods)?
- allocation mechanism(s), with a basic distinction between allocation by market (auctioning) and allocation for free (based on grandfathering or some type of benchmarking);
- external offsetting and linking, including the rules for allowing external offsets/credits (whether national or international, such as CDM credits), and provisions for linking up to other systems;
- MRV (monitoring, reporting and verification) and enforcement, pertaining to the rules for carrying out these tasks and reacting to cases of non-compliance;
- price management, pertaining to the rules and possible institutions established to stabilize the carbon price (such as price floors/ceilings or quantity-focused measures);
- revenue earmarking, concerning possible rules for earmarking auctioning revenues for specific activities or sectors.

In explaining similarities and differences in the design of systems, in this report and in later in-depth case studies in the ETS DIFFUSION project, we will pay particular attention to the role of policy diffusion, linking up to the rich literature and discussion in political science (e.g. Elkins and Simmons 2005; Börzel and Risse 2012; Shipan and Volden 2012). Policy *diffusion* can be seen as a particular type of 'interdependent, but uncoordinated decision making' in which a party *unilaterally* adopts a policy or practice initiated and pursued by others (Elkins and Simmons 2005: 35).

Drawing on this literature, we distinguish between two main triggers, operating through different causal mechanisms. The first main trigger has to do with *cognitive* or *normative* influence – *ideas* – that can be understood in constitutive terms (notably, internalization or socialization). Diffusion may take the form of more or less sophisticated *learning* that may involve correcting design 'errors' in response to the perceived failures of another system. Relevant lessons can be communicated through bilateral channels (like the collaboration agreement between California and China) or multilateral channels (e.g. discussions in the International Carbon Action Partnership, ICAP), and communicated by governmental and non-governmental actors alike (as for instance the International Emissions Trading Association, IETA).

Diffusion may also take the form of simple *emulation*, which usually involves copying policies or practices pursued by prestigious peers.

The second main trigger involves *material consequences* and operates through the mechanism of *adaptation* to altered conditions. This mechanism directs attention to 'competition and coercion' stemming from growing political and economic interdependencies between economies and the related impact of these on the payoff structures associated with the pursuit of different policies. This highlights the need for analysing economic interdependency relationships and the extent to which decision-makers and industries perceive policy differences as an impediment to effective low-carbon policymaking. This includes efforts by governments or international organizations (like the World Bank) to induce greater international policy harmonization through financial incentives – which may be seen as a sort of coercion.

However, diffusion is not necessarily the main causal driver for the shaping of ETS design such processes.1 We need to be able to catch central other social drivers, without getting lost in the intricate causal processes.

As an initial focal point, we will pay specific attention to the interaction with other policy instruments. For instance the history of the EU ETS, further elaborated in section three, indicates that the turn to emissions trading was much induced by the preceding failure to adopt a carbon tax. Furthermore, as political systems differ substantially, in social level (sub-national, national, supra-national) and in economic system and social steering (take the case of California versus China), also the key social drivers will differ. In this report we provide only a very brief overview of some key internal drivers.

[1] However, as noted by Shipan and Volden (2013: 788), 'those who wish to understand why governments adopt particular policies would be hard-pressed to find examples of policies that are selected entirely for internal reasons.'

3 The four main ETS waves: design and diffusion

3.1 First wave: the road to Kyoto

Here we will only briefly sum up some main developments: for further details, see e.g. Calel 2013; Paterson et al. 2013. One early development was not strictly part of the climate change context: the 'Project 88' network of economists and policymakers advocating ET in environmental policy in the late 1980s, and the subsequent initiation of sulphur dioxide (SO2) trading in the USA (Paterson et al. 2013: 432). It is relevant to mention because it contributed to the formation of the US position in the preparations for the Kyoto Protocol, emphasizing the need to include international flexibility mechanisms. In these preparations and negotiations, the EU stood out as a flexibility sceptic, due partly to lack of internal experience with instruments such as emissions trading.

However, studies indicate that the negotiations functioned as a venue for learning about emissions trading, also for EU policymakers (Damro and Luaces Mendez 2003). When the Kyoto Protocol was adopted in 1997, it included three flexibility mechanisms: the Clean Development Mechanism (CDM), geared towards credit-raising projects in the South; Joint Implementation (JI), geared towards credit-raising projects in Eastern Europe; and international emissions trading, where Annex B countries could buy and sell 'Assigned Amount Units'. However, the specific design of the third mechanism was deferred to later meetings, so there was no model that could serve as a blueprint for subsequent ETS initiatives.

3.2 Second wave: EU ETS establishment as key event

3.2.1 Brief overview

Having unsuccessfully opposed flexibility mechanisms (including ET) in the process leading up to the 1997 Kyoto Protocol, the EU made a turnabout in mid-1998 and decided to start developing its internal emissions trading system. In shaping a proposed possible design the Commission was assisted by several external consultant reports. Communication with governmental and non-governmental stakeholders was a key ingredient in the process, and the Green Paper issued in 2000 was important in further fleshing out central design options and choices (Commission 2000). This was followed up with stakeholder meetings within and outside of the process of developing the first European Climate Change Programme in 2000 and 2001.

Although the 2000 Green Paper revealed a preference within the Commission for a fairly centralized system based on auctioning of allowances, stakeholder inputs led the Commission to present a formal directive proposal in October 2001 that outlined a decentralized system with allowances handed out for free. During 2002 and early 2003, both the European Parliament and central EU member-states like Germany and the UK sought to get the proposal amended. But their efforts had limited success: in the summer of 2003, an only slightly revised directive deciding the design of the ETS for both the pilot phase 2005–2007 (phase I) and the Kyoto Protocol commitment phase 2008–2012 (phase II) was adopted (Directive 2003/83) (see process overviews in Christiansen and Wettestad 2003; Wettestad 2005; Skjærseth and Wettestad 2008; Van Asselt 2010; Meckling 2011; Dreger 2014).

3.2.2 Key design features adopted in 2003

- **Type of system:** Cap-and-trade, with certain minor initial opt-out and opt-in possibilities. As to intra-temporal safety valves, banking was to be allowed from phase II on, but not between phases I and II. The governance level was supra-national, with the main rules decided at EU level. But considerable authority was given to member states in phase I, and key entities were sub-national industrial installations.

- **Ambition level:** No common cap was established for ETS phases I and II. There was only a loosely worded link to the need for the ETS to contribute to the achievement of the EU's Kyoto Protocol commitment of an 8% reduction (points 2 and 5 in the preamble).

- **Sectors, gases and emissions covered:** The main target group was the energy-producing sector (referred to in the 2003 Directive as 'energy activities') but also certain energy-consuming industries: 'production and processing of ferrous metals' (like iron, steel); 'mineral industry' (cement, glass, ceramics); and 'other activities' (pulp and paper). Formal rules were not differentiated across sectors. Around 40% of EU CO2 emissions were covered.

- **Allocation mechanism(s):** In the pilot phase, there was to be at least 95% allocation by governments, through National Allocation Plans; in phase II, at least 90% free allowances.

- **External offsetting and linking:** The Directive opened up for the use of Kyoto Protocol offsets/credits (CDM/JI), although Article 30 stated that this use should be supplemental to domestic action. More specific rules were set out in the subsequent 'linking directive' (2004/101): only CDM credits could be used for compliance in the phase I, with also JI credits becoming useable in phase II. No particular countries or sectors were given priority. But credits from nuclear power projects were banned; the use of credits from sinks/forestry was limited to the pilot phase; and credits from hydropower plants were allowed as long as they took account of 'environmental and social impacts'. As to linking with other emissions trading systems, Article 25 stated the general goal of entering into agreements with countries that had ratified the Kyoto Protocol, for 'mutual recognition' of allowances from their ETS.

- **MRV and enforcement:** Member-states were to ensure that emissions were monitored by the included installations in accordance with overall guidelines. Installations were to report annually on emissions. These reports were to be prepared by accredited verifiers in line with specified criteria. Subsequently the installations would have to hand in permits in accordance with allowed maximum numbers. Member states were also required to establish and maintain registries, ‘accessible to the public’, with overviews of the holding and transfer of allowances. Further, member-states were to submit annual reports to the Commission on their application of the Directive. In phase I penalties were set at 40 euros for each ton of excess CO2 equivalents, increasing to 100 euros per ton in phase II.

- **Price management:** No mechanisms were established initially.
- **Revenue earmarking:** As it was decided to hand out allowances mostly for free in the two first phases of the ETS, no significant revenues were foreseen; hence the issue of earmarking became irrelevant.

3.2.3 Did diffusion shape this design?

The short answer is: moderately, but other factors were clearly more important. Let us first sum up main insights on the role of policy diffusion. Starting with the mechanism of ‘learning’, the fundamental choice of going for a cap-and-trade system was inspired by US experiences. As further elaborated in Skjærseth and Wettestad (2008), key figures in DG Environment were economists and had studied emissions trading in the USA. Damro and Luaces Mendez (2003) mention the negotiations in 1997 leading up to the Kyoto Protocol as a venue for transferring lessons from the USA to EU policymakers. Zapfel and Vainio (2002: 7) state that in the immediate post-Kyoto phase, US actors such as EPA staff, ENGO Environmental Defense, and the think-tank Center for Clean Air Policy (CCAP) ‘invested a lot of time and pressure in participating in the European [ETS] debate’. However, given the different institutional, cultural, legal and administrative nature of the EU, ‘the value of the contributions by US experts declined steadily’ (ibid.: 9). This was also due to the lack of development of a national US ETS. Paterson et al. (2013) further support this view of very limited US influence on the evolving design of the ETS, noting the important underlying division between US and European ‘trading communities’, with limited cross-community personal contacts.

An important document in discussions on the possible design of an EU ETS was the Green Paper put forward in 2000 (Commission 2000). This document contained no explicit references whatsoever to US experiences in this policy field; neither did the consultant reports co-authored by CCAP and FIELD (1998, 1999). Still, Damro and Luaces Mendez (2003: 89) claim that key aspects of the design of the monitoring and verification system, not least the registry part but also the penalties regime, were borrowed from the US SO2 system.

As to the ‘adaptation’ mechanism, we should note that at the stage in global climate politics when the EU made a turn-about and started to develop emissions trading (from 1998 on), the EU saw itself as a front-runner – as it indeed was, comparatively speaking (see Grubb et al. 1999; Christiansen and Wettestad 2003). ETS design choices did not emanate from any fundamental need to adapt to the actions of others, in the sense of ‘ratcheting up’.

However, the pioneering position made EU industries, primarily the energy-intensive industries competing in the global marketplace, worried about an uneven global economic and regulatory playing field (Skjærseth and Wettestad 2008; Wettestad 2009). These concerns were voiced in the Commission's various stakeholder consultations, channelled also through member-state inputs. This element clearly contributed to the decision to establish an ETS where initially almost all allowances were handed out for free, although also other concerns played a role (as further discussed below). These worries also contributed to the decision to link up the ETS to the Kyoto flexibility mechanisms, as such a link was seen as a safety valve against a too high carbon price. With regard to the EU's Kyoto Protocol commitment to an 8% reduction, this functioned only as an yardstick for the ambition level of the system. However, with no common cap established for the ETS, this link to the Kyoto Protocol had little practical significance.

3.2.4 Other shaping factors

Which main factors shaped the initial ETS design? Peter Zapfel was one of the main initial ETS architects, 'present at the creation'. In his 2002 exposé (written together with Matti Vainio) he places considerable emphasis on several rounds of stakeholder consultations, with a majority of member-states and industries stating their clear preference for a decentralized design, and allowances to be handed out for free (Zapfel and Vainio 2002; see also Watanebe and Robinson 2005). Also industry was active, as with the establishment of company-internal systems in BP and Shell, and ET simulations conducted by the power industry (GETS I and II) (Victor and House 2006).

So the preferences of key industries and member-states no doubt shaped central design features in the directive proposal put forward in October 2001. As further discussed in Skjærseth and Wettestad (2008), much of this design survived the subsequent decisionmaking process. Concerning central design features like the degree of centralized steering of the system and the allocation method, the Commission chose to heed key sentiments among industries and member-states, rather than pushing its own preferences for centralization and auctioning. There was limited willingness to set up the Commission as a strong watchdog for the system, and the lack of price management mechanisms in this initial design may be interpreted as a result of this reluctance.

3.2.5 Concluding reflections

Summing up, what were then the centres of this wave and what influenced EU ETS design most? The prime centres at this stage appear to have been, first, the global negotiating process leading up to the Kyoto Protocol in 1997, and, second, the US development of emissions trading of air pollutants. But in shaping the more specific design, US experiences played a very moderate role, declining over time as design discussions became more specific and tailored to the European context. Thus we see that diffusion from the two epicentres is not the key to understanding the initial ETS design: we must look at the interaction of various factors at the sub-national, national and EU levels.

3.3 Third wave: spotlight on California, Australia and EU ETS revision

3.3.1 Introduction

The third wave in the development of emissions trading systems started in 2004/5. Due to initial uncertainty as to the role of the federal government in regulating GHG emissions, emissions trading in the United States was marked by experimentation with regional and private initiatives. On the East Coast, the Regional Greenhouse Gas Initiative (RGGI) was launched in 2005 (Hoffmann 2011). In 2007, the Western Climate Initiative (WCI) was founded as a sub-national policy collaboration of independent jurisdictions in Canada and in the USA (British Columbia, Manitoba, Ontario, Quebec and California). The WCI member-states committed to an overall GHG reduction goal of 15% of 2005 emissions by 2020, and agreed to establish a regional registry to measure and track emissions. To date, the only WCI members that have established cap-and-trade systems are California and Quebec, but Ontario has announced its intention to launch an ETS (13 April 2015).

In Japan, a voluntary system was put in place in 2005, followed by an experimental ETS in 2008 which was intended to lead into a nationwide ETS (Van Asselt forthcoming 2016). New Zealand launched an ETS in 2008 (NZ ETS), with a uniquely comprehensive coverage of sectors and gases. It covered the sectors of liquid fossil fuels, stationary energy, industrial processes, forestry, agriculture and waste. All six main Kyoto Protocol gases were covered. In a somewhat parallel development, Australia initiated relevant assessment and modelling work in 2007 (the Garnaut process). This led up to a proposal on a Carbon Pollution Reduction Scheme (CPRS), which included an Australian ETS. However, the CPRS collapsed politically in 2010. In Europe, the EU ETS started functioning in 2005, but not very well, with a price crash in 2006 and the price dipping close to zero in 2007. When the rules for the third phase (2013–2020) were discussed and negotiated in 2007 and 2008, the outcome was a significantly changed system.

3.3.2 California: seeking to avoid EU mistakes?

Brief overview

The evolution of emissions trading in California is significant not just as a case of political leadership in the USA (Victor 2010), but also because California is the ninth-largest economy and the fifteenth-largest emitter of GHG in the world, responsible for some 2% of global emissions. In 2006, Assembly Bill 32, the Global Warming Solutions Act of 2006, was enacted in California. Known as AB 32, it was signed into law by Governor Arnold Schwarzenegger in September 2006. AB 32 requires the California Air Resources Board (CARB) to develop regulations, possibly including market mechanisms, to reduce greenhouse gas emissions to 1990 levels by 2020. The legislation also required CARB to develop a Climate Change Scoping Plan (to be updated every five years) towards achieving cost-effective greenhouse gas emissions reductions by 2020. In 2008, CARB announced the first Scoping Plan, which included a broad range of recommended strategies, direct regulations, market-based approaches, voluntary measures and other programmes. A key measure for achieving the 2020 emissions reduction target included in AB 32 and the Scoping Plan was the implementation of a cap-and-trade programme in California. CARB began developing such a programme in 2009, and submitted the programme rules for final approval in 2011.

The California Office of Administrative Law approved the rules for the cap-and-trade programme on 13 December 2011. Thereby, Article 5: 'California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms' was formally added to Subchapter 10 of Title 17 of the California Code of Regulations. Several legal challenges have been filed against CARB, but various courts in California have issued decisions in favour of the Board.

The California ETS became effective on 1 January 2012. The first compliance period was for two years, 2013 and 2014; the second and third are for three years each: 2015–2017 and 2018–2020.

Key design features[2]

- **Type of system:** Cap-and-trade scheme with a common cap and with allowances distributed upfront. Banking is allowed. In any year, allowances from any prior year may be used for compliance, or sold. Banked allowances never expire, but the quantity of banked allowances is subject to holding limits. Borrowing allowances from future periods, for compliance in the current period, is allowed only if necessary for meeting an excess emissions obligation.
- **Ambition level:** As mandated by the state legislature, California's *economy-wide target* for emissions reductions is to achieve *1990-level emissions* by 2020 through the use of a cap-and-trade regulation, which began in 2013, and other means. The programme will thus cap emissions at 334 million metric tons by 2020 to help meet a requirement in AB 32 that emissions in the state of California that year are to equal 1990 levels.
- **Sectors, gases and emissions covered:** The scope of California's ETS is significantly broader than that of the EU ETS, with carbon pricing encompassing a wide range of sectors and various greenhouse gases, not only carbon dioxide and (from EU ETS phase III onwards) nitrous oxide. For the first compliance period, the scheme covered generation emissions from first deliverers of electricity, and process emissions from a range of major industrial sources, including refiners of petroleum and natural gas. Verified emissions related to process emissions, stationary combustion emissions and vented emissions were covered. In the second compliance period, the programme also covers suppliers of natural gas, distillate fuel oil and liquefied petroleum gas. From 2015, reported emissions from all imported electricity cars carry a

[2] This section draws on EDF/IETA (2014) and CDC Climat/EDF/IETA (2015b).

compliance obligation. After 2015, the ETS programme will cover 85% of California's GHG emissions.

- **Allocation method(s):** The largest businesses in the state – defined as those that emit more than 25,000 tons of carbon dioxide a year – must obtain permits from the state government for their emissions. The state distributes most of these permits free of charge, and has developed an auction system for the rest. In 2013, California freely allocated most allowances to two categories of covered entities: vulnerable industries (including refiners) and electricity generators (utilities). About 90% of the state-issued permits are initially allocated for free. CARB has introduced an *industry assistance factor* to minimize the risk that industry entities may leave California due to competitive disadvantages caused by cap-and-trade. An industry's economic leakage risk is classified as high, medium or low (EDF/IETA 2014b); and there are two types of benchmarks in the California ETS system: product and energy based.
- **External offsetting and linking:** No more than 8% of a company's total compliance obligation for each compliance period may be met by using any type of approved offset. By April 2015, CARB had accepted five offset protocols, based primarily on Climate Action Reserve protocols, covering ozone-depleting substances, livestock projects, urban forest projects, forest projects conducted within the United States, and coal-mine methane capture. CARB is considering two more offset protocols, one for reducing methane from rice cultivation and one for nitrogen management. Out of the 8% limit on total offset usage, a certain portion may be used for international sector-based offsets (limited to 2% of a firm's total compliance obligation in the first compliance period and 4% of a firm's total compliance obligation in the second and third periods). Under the current protocols, no offsets are allowed outside of the United States, Canada and Mexico. On 1 January 2014, California officially linked its cap-and-trade programme with Quebec's via the Western Climate Initiative (WCI). Under the linked systems, compliance instruments will be recognized as mutually and equivalently acceptable in either jurisdiction. In January 2015, CARB initiated a process aimed at establishing a quantification methodology and standard for greenhouse gas reductions from carbon capture and storage (CCS) projects, with a view to including CCS credits in the cap-and-trade programme.
- **MRV and enforcement:** The Mandatory Reporting Rule (MRR) under AB 32 obliges California entities to report and verify their in-state emissions to CARB.3 The Board has the authority to reverse transfers of compliance instruments if an entity exceeds its holding limit. CARB has also committed to monitoring the trading system to detect and prevent attempts at gaming or fraudulent activity.

[3] The final MRR regulation can be viewed here: www.arb.ca.gov/regact/2010/ghg2010/mrrfro.pdf

- **Price management:** For auctioned permits (initially only 10% of the state-issued permits), CARB has established a floor price, starting at USD 10 for 2012 auctions, to rise annually by 5% plus the rate of inflation. An Allowance Price Containment Reserve (APCR) will collect a portion of allowances from auction each year and release them if certain predetermined trigger prices are reached. The percentage of allowances withheld from auction to fill the APCR will be as follows: 1% for 2013–2014, 4% for 2015–2017, and 7% for 2018–2020. Thus far, no allowances have been purchased from the APCR, as market prices for allowances have remained far below the set price tiers of the APCR.
- **Revenue earmarking:** Proceeds from allowance auctions go into the Greenhouse Gas Reduction Fund to advance the objectives of AB 32. CARB and the Department of Finance develop a three-year investment plan, the first one issued in April 2013, for directing investments of auction proceeds. Expenditures consistent with the investment plan are arranged through the annual California budget process.

The role of international diffusion

Having summed up the key design properties of the California emissions trading system, let us now ask: what do we know about policy diffusion shaping this design? An important sub-issue here is learning from the EU ETS, given its frontrunner role and the similarities between emissions trading in the EU and California, although learning from North American ET initiatives is likely to have played a role as well. As cap-and-trade has been intensely debated in both Europe and North America (Betsill and Hoffmann 2011: 89), we would expect political debates about cap-and-trade in California to have been influenced by the EU ETS and other experiences with cap-and-trade.

However, Paterson et al. (2014) argue that lesson-drawing across the Atlantic was limited, and that the idea of emissions trading in the EU and the United States emerged at the same time but independent of developments on the other side of the Atlantic: ‘our analysis reveals that this policy idea [emissions trading] developed almost simultaneously in the United States and Europe, with very tenuous links between them and prior to actors in either jurisdiction adopting ET as an actual policy tool’ (Paterson et al. 2014: 423).

Still, although the evidence indicates that EU experience did not play a prominent role in the political discourse about emissions trading in California, it is held to have played some role in the technical discussions on the design of the California scheme. The EU ETS is cited both as a positive example from which to draw lessons, and as a negative case that enabled lessons-drawing from the mistakes made by the EU, particularly in the first phase of the ETS (Betsill and Hoffmann 2011; Biedenkopf 2012; Paterson et al. 2014).

Several observations can be made with regard to transatlantic policy diffusion. First, EU policy experts promoted the ETS through various direct contacts with North American actors, which enabled communication and learning. Two EU ETS experts were seconded to California for an extended period during the design of the programme (Biedenkopf 2012: 19). One of these experts worked with CARB, which is in charge of implementing California GHG emissions policy; the second expert worked with the California Environmental Protection Agency. These experts were seconded by the UK, an EU member-state, and the Commission helped to coordinate their activities (ibid.).

Second, possibly learning from EU ETS experience, California opted for some auctioning of allowances from first compliance period, not free allocation of all permits. In this regard, California may have learned from EU experience about avoiding likely problems with low permit prices and windfall profits. In the first phase of EU ETS, free allocation had brought windfall profits to power companies that received allowances without cost and nevertheless charged their customers. Although most venues that are or have been operational began with free allocation of permits, there is a trend toward convergence around auctioning. As noted by Betsill and Hoffmann (2011: 96), 'The preference for auctioning since 2003 likely reflects lessons learned from the E.U. ETS experience during Phase 1, where free allocation, along with an over-allocation of permits, led to a dramatic collapse in permit prices. Since then, policy makers tend to prefer that at least some permits be auctioned in order to send a clear price signal, and to avoid charges of windfall profits'. However, although the percentage of free allowances allocated to regulated entities in California will decline over time, it will initially cover approximately 90% of a facility's total emissions based on baseline data. This corresponds roughly to the share of free allocation in phase II of the EU ETS (2008–2012).

Third, like the EU ETS, the Californian system includes not only the power sector but also energy-intensive industries (e.g. cement, iron and steel, pulp and paper). By contrast, the Regional Greenhouse Gas Initiative (RGGI) has a narrower scope, regulating only emissions from the power sector. This may indicate that policymakers in California looked to Europe rather than to RGGI on the East Coast for lessons learned concerning the appropriate coverage of an ETS.

Fourth, like the EU ETS, the Californian system provides for access to some types of offsets, subject to quantitative and qualitative restrictions. However, while the EU ETS Directive, following its 2008 revision, indicates that the use of credits in the 2008–2020 period could be up to half of the EU-wide reductions below 2005 levels, California permits their use only up to 8% of a covered entity's obligation for each compliance period. The more stringent restrictions in place in California may be a result of learning that using international offsets in an ETS reduces the incentives for domestic or regional mitigation. Regarding qualitative restrictions on the *types* of credits that will be accepted, the EU ETS has limited the use of credits from land use, land-use change and forestry since its inception, whereas California allows credits from US forest projects and is considering allowing credits from REDD+ (Reducing Emissions from Deforestation and Forest Degradation) and other sector-based initiatives.

Fifth, at a more technical level, US emissions trading schemes appear to have learnt from the EU ETS that having solid baseline data is important in order to avoid over-allocation and windfall profits, as experienced in the first phase of the ETS. Regarding the WCI, Biedenkopf (2012) highlights the security breaches in the EU with regard to the ETS registry as one technical aspect that WCI designers noted, and how ‘these lessons from an EU mistake contributed to awareness of data security aspects in the WCI rules’ (ibid.: 20).

In conclusion, although the EU ETS did not directly trigger the inception of an ETS in California, lessons from the EU were discussed there and seem to have influenced several programme design properties.

Other shaping factors

The lack of federal climate regulation in the United States, coupled with a facilitating political and institutional context in California, have been pointed out as important triggers for the inception of its emissions trading system. (Farrell and Hanemann 2009; Betsill and Hoffmann 2011; Hoffmann 2011; Biedenkopf 2012). As Farrrell and Hanemann (2009: 90) argue, ET ‘emerged in large part due to the character of California’s polity and institutions’ More generally regarding the transnational spread of emissions trading systems, Paterson et al. (2014: 426) hold that ‘[t]he functional story about learning and emulation does not fit because most early adopters took on the policy as an experimental exercise rather than based on success in other jurisdictions’.

Examination of other North American initiatives supports the impression that domestic political factors were the most important trigger for the initiatives. In particular, the lack of federal climate regulation is cited as the main trigger for regional ET initiatives (see e.g. Biedenkopf 2012).

Concluding reflections

Learning from EU experience seems to have informed the design of particular ETS properties in California. While domestic factors triggered the emergence and evolution of California’s scheme, drawing lessons from the EU ETS experience appears to have been influenced certain design characteristics. Such lessons-drawing from the EU ETS occurred primarily at the more technical level, and less so with regard to the idea of emissions trading, which came from the United States and not the EU.

These findings point to the key role of experts and epistemic communities in the spread of knowledge about carbon markets and trading (Stephan and Lane 2015). Indeed, ‘the idea of ET for greenhouse gases was germinated among relatively small groups of economists, environmentalists, and policy makers in the late 1980s and early 1990s and eventually grew to not only dominate the governance of climate change but also to proliferate in diverse ways over time, space, and political jurisdiction’ (Paterson et al. 2014). As to the specific lessons learned from the EU experience, we find that EU ETS experts, not least those seconded to California for an extended period, seem to have played an important role in transferring knowledge about design properties and the technical aspects of operating an emissions trading system.

3.3.3 Australia: Looking to Europe?

Evolution of ET in Australia

Australia generates only some 1.4% of total global greenhouse gas emissions, but is among the world's highest per-capita emitting countries. Its fossil-fuel dependent economy relies on coal for domestic electricity generation, and the country's strategic significance in international climate politics is further underlined by its status as a major exporter of coal, natural gas and minerals to Asian economies.

Australia's first attempt to establish an ETS was the Carbon Pollution Reduction Scheme (CPRS), proposed by Prime Minister Kevin Rudd in 2008 and to be introduced in 2010. The design of the CPRS was strongly influenced by modelling work on an ET system in the first Garnaut Review, after Rudd asked Australian National University economist Ross Garnaut to examine the impacts of climate change on Australia and recommend medium- to long-term policy solutions (Bailey et al. 2012; Crowley 2013a, 2013b). Rudd initiated the Garnaut process in July 2007, as part of his electoral positioning before he became prime minister, and Garnaut, as a key advisor to the Rudd government, subsequently played a significant role in devising an ET system. The Garnaut Review (2008) recommended an Australian ETS, and detailed several design features that eventually became central in the proposed CPRS, but Garnaut's recommendations were progressively eroded in Green and White Papers (see Bailey et al. 2012: 703). The CPRS eventually collapsed in 2010 under intense domestic political-economic pressures (Bailey et al. 2012).

A new Australian Carbon Pricing Mechanism (ACPM) was temporarily introduced by the Gillard Labour minority government under the 2011 Clean Energy Future Act. Explanations for the successful introduction of carbon pricing (which proved short-lived) point to the circumstances of a minority government, where the Greens demanded a process for establishing an ETS in return for their support of the Gillard government (Crowley 2013b). As agreed with the Greens, the Gillard government established a Multi-Party Climate Change Committee process and garnered the support of several independent representatives. The parties agreed to the ACPM, ensuring its passage through parliament (Crowley 2013b).

However, carbon pricing remained politically contentious and was targeted for dismantling by the new Prime Minister, Tony Abbott, prior to and following his victory in the 2013 elections. Although Abbott did repeal the Carbon Pricing Mechanism in 2014, the attempts undertaken in Australia provide evidence of the influence of various external and internal processes on the diffusion of emissions trading.

Key design features[4]

The focus here is on the Australian Carbon Pricing Mechanism (ACPM), passed on 8 November 2011 under the 2011 Clean Energy Future (CEF) Act. Although Prime Minister Abbott later dismantled carbon pricing, a review of the key features of the ACPM can shed light on the influence of various external and internal processes on the emergence of emissions trading in Australia.

- **Type of system**: Cap with a carbon pricing mechanism, which commenced on 1 July 2012 as a permit system with a fixed price on carbon, like a tax. Permits could be bought from the government at AU$23 a ton for carbon, rising at 2.5% per annum in real terms for three years. The ACPM was scheduled to transform into a floating-price ETS from 1 July 2015 onwards (brought forward in 2013 to 2014 in response to domestic political pressures), before the Abbott government repealed the ACPM in 2014 following the 2013 election. Banking was not to be permitted within the first three years of the ACPM, while prices were fixed, and compliance had to be fulfilled annually. However, unlimited banking of allowances between years was to be permitted after 2015, when carbon prices became more flexible in the planned ETS. Borrowing would have been limited, with entities being allowed to surrender up to 5% of their liability from permits from the following year.
- **Ambition level**: The Australian emissions reduction target from January 2010, established by the government following COP15 in Copenhagen in 2009, is to reduce emissions 5% below 2000 levels by 2020 – an unambitious target compared to that adopted by the EU. The government signalled that it may increase its target to 15–25% below 2000 levels by 2020 in the event of a strong new international climate agreement that includes all major emitting countries. The government also established a long-term target of 80% below 2000 levels by 2050. Annual emission caps were set in May 2014 for 2015 onwards. Caps were set five years in advance, to ensure that national emissions meet international obligations.
- **Sectors and gases covered**: The scope of the ACPM was significantly broader than that of the EU ETS, with carbon pricing encompassing most power-generation sources, oil and gas manufacturing processes, industrial processes, fugitive emission processes (with the exception of decommissioned coal mines), and non-legacy waste. The scheme covered some 60% of Australia’s emissions, and around 500 of Australia’s biggest polluters were required to pay for their emissions under the system. It excluded agricultural emissions, land-use emissions, and transport fuels from the cap, but fuel-related emissions from domestic-based aviation, shipping and railways were covered. Another major departure from the EU ETS was that the ACPM covered four greenhouse gases: carbon dioxide, methane, nitrous oxide and perfluorocarbons, rather than just carbon dioxide and (from EU ETS phase III onwards) nitrous oxide.

[4] This section draws on EDF/IETA (2014) and CDC Climat/EDF/IETA (2015a).

- **Allocation mechanism(s)**: From 1 July 2015, the ACPM would have been based on free allocation of permits to *emissions-intensive trade-exposed industries* (EITEI) and auctioning to other industries and power producers. The level of free allocation would depend upon the level of EITEIs applying for assistance through free allocation. The exact amount to be auctioned would not be a fixed percentage, but would be determined by the ACPM Regulator once free units had been allocated or bought back from covered entities.
- **External offsetting and linking**: The ACPM made more extensive use of both domestic and international credits than did the EU ETS. The Australian Carbon Farming Initiative allows the production of offset credits in agriculture and land-use management. Australian Carbon Credit Units (ACCUs) produced by the Carbon Farming Initiative were limited to 5% of a company's compliance obligation when the carbon price was fixed, but there would have been no limits in place once the flexible prices had commenced in 2015. The project-scale system for creating domestic land-sector offsets was a unique feature of the Australian ET system. As of 2015, international credits could have been used for up to 50% of an entity's compliance obligation, with up to 12.5% of obligations coming from respectively Kyoto Clean Development Mechanism (CDM) and Joint Implementation (JI) credits. The Australian government saw international linking as a key cost-containment device and had identified the EU and New Zealand as its most promising linking partners. The proposed link with the EU ETS would have been the first international linking of emissions trading systems.
- **MRV and enforcement**: The government and parliament retained oversight and responsibility for major policy decisions, such as setting annual national emissions caps and linking. However, an independent Clean Energy Regulator was established to oversee the allocation and auctioning of units, monitoring, reporting and verification of emissions, and the administration of the Carbon Farming Initiative. A new Climate Change Authority provided advice to the government on national emissions caps, integrity of international credits, the performance of the ACPM, level of assistance/compensation and linkages as well as other mitigation activities. This was dismantled by Rudd following the 2013 elections.
- **Price management**: The ACPM was divided into three phases of price management: fixed, flexible and floating. During the fixed-price phase, companies purchased allowances directly from the government for AU$23 (increasing annually with inflation), with additional limited offset possibilities. From 1 July 2014, the market would have set the carbon price. The flexible price phase from 2014 to 2018 envisaged the government setting a price *ceiling* at AU$20 above the international price (i.e. EU Allowance price), rising 5% annually. As a result of the EU–Australia linking agreement, there would be no price *floor* in place during the flexible price period from 2014 onwards. During the floating price phase after 1 July 2018, the price ceiling was planned for removal as greater access to international markets, thorough links and credits, was expected to become an important cost-management measure.

- **Revenue earmarking**: Revenues raised from the carbon price were expected to be used to provide tax cuts and increased benefits to households, to support jobs in the most affected industries, and for investment in less carbon-intensive developments and technologies.

The role of diffusion

A review of document sources indicates learning from the history of the EU ETS, sustained interaction with other governments like that of New Zealand, and potential linking to the EU ETS as well as international organizations like the International Carbon Action Partnership (Bailey et al. 2012; Calel 2013; Crowley 2013a, b; Patay and Sartor 2012; Peel 2014). However, we also note considerable – and progressively increasing – influence from internal dynamics as well as 'negative' learning from other jurisdictions aimed at avoiding design mistakes made by frontrunners, and at adapting emissions trading to the specificities of the Australian economy and political and popular debate on climate policy (Bailey et al. 2012; Crowley 2013a, b).

As mentioned, the design of the failed CPRS, which informed the design of the ACPM, was strongly influenced by modelling work on an ETS in the first Garnaut Review. This voluminous review was, in turn, informed by the EU ETS, as highlighted in the report (Garnaut 2008: 359). Despite the failure of the CPRS, Garnaut's recommendations significantly influenced the design of the ACPM (Crowley 2013a: 377). The Gillard government asked Garnaut to update his 2008 review and, among other policy proposals, to address the deficiencies of CPRS and remake the case for carbon pricing (Bailey et al. 2012: 705; Crowley 2013a). In this sense, the Rudd government's failed efforts to introduce the CPRS helped pave the way for carbon pricing in Australia, if only temporarily.

The unambitious emissions reductions target under the Australian scheme, compared to that adopted by the EU, have been attributed to industry lobbying, a booming minerals sector and lack of immediate alternatives to coal-fired electricity (Bailey et al. 2012; Patay and Sartor 2012). Regarding policy diffusion, Patay and Sartor (2012: 3) argue that the flexible approach to setting medium-term emissions caps, dependent on action taken by other countries, was a reaction to the sharp decline in the allowance price experienced by the EU ETS following the economic recession.

The Australian scheme was more comprehensive than the first phase of the EU ETS, which had covered only 45% of emissions and only carbon dioxide. The proposed CPRS covered 75% of Australian emissions, including coal and other mining, steel, aluminium, cement, and plastics and chemicals (and agriculture from 2015), as well as all six Kyoto greenhouse gases (Bailey et al. 2012: 697). The Australian system was also unique in including a project-scale system for creating domestic land-sector offsets. The failed CPRS significantly informed the ACPM, although emissions coverage was reduced to about 60%, and the greenhouse gases covered were reduced from six to four (Crowley 2013a: 378). Other design features carried over from the CPRS included an unconditional 5% emissions reduction target by 2020 from 2000 levels;

carbon price set based on an ETS; initial transitional period with fixed permit prices; liability thresholds remain 25,000 tCO2e of direct (scope 1) emissions; free allocation of permits to emissions-intensive trade-exposed industries (EITE); auctioning of permits during the flexible price phase; assistance to household, and industry adjustment assistance (Crowley 2013a: 378).

Hence, unlike the phasing-in of sectors over time in the EU ETS and New Zealand ETS, the ACPM and its predecessor, the CPRS, had broad coverage from the start. This may indicate learning from EU experience that broad coverage from the initiation of an ETS might be preferable to the phasing-in of sectors over time, although it certainly also reflected Prime Minister Rudd's political ambition of creating a genuinely world-leading ETS, and the perceived need for liquidity in a relatively small market (Bailey et al. 2012: 697).

Another example of learning from the EU ETS might be the Australian decision to have an initial phase in which permits are traded at a fixed price, to help the regulator establish the appropriate level of the cap for the second trading phase (Calel 2013). This decision was presumably informed by the price plunge of carbon credits in the first phase of the EU ETS, although it has been argued that the initial fixed price was the result of consensus between the Greens and the government who could not agree on a national target or cap but managed to agree on an initial fixed price to get the scheme started (Jotzo 2012: 475). The use of an initial fixed price also provided greater certainty for businesses and more time to prepare for the next phase with floating prices (ibid.).

Some analysts argue that the Australian scheme learned from the EU ETS the importance of establishing the legal status of allowances from the outset, to avoid fraudulent activity and lack of market oversight (Patay and Sartor 2012; Peel 2014). Van Asselt (forthcoming 2016) maintains that the Australian scheme shows 'policy learning' from the EU's experience of free allocation through the decision to provide a higher proportion of auctioning from the start. Also the many similarities between the two ETS schemes suggest that Australian policymakers and experts learned from EU experience. Similarly, we can note examples of policy learning from the experiences of EU member-states. Patay and Sartor (2012) and Peel (2014), for example, hold that the establishment of the independent Climate Change Authority was based on the UK Climate Change Committee.

Efforts to link the Australian ACPM with the EU ETS provide further evidence of policy interaction and diffusion of emissions trading. In September 2011, EU Commission President Barroso and Australian Prime Minister Gillard met in Canberra and announced their intention to start discussing linking of trading systems between the two schemes (Reuters Planetark 2011). Just two months later, the ACPM was passed. In August 2012, the Australian government and the EU released the details of a proposed linking agreement. A one-way link, enabling Australian firms to purchase European Union Allowances (EUA) for compliance, would be operational from 1 July 2015 to 1 July 2018. [5] A two-way link, enabling European entities to purchase Australian permits, was to be in place no later than 1 July 2018. Full linkage would require the parties to agree on several design issues, including the treatment of international offsets and land sector credits. The agreed pathway towards full linkage between the two systems included two adjustments to be made to the Australian system: the scrapping of a new price floor, and a new limit on the use of Kyoto offsets (Commission and Combet 2012; ENDS Europe 2012; Wettestad and Jevnaker 2014).

In January 2013, the Commission put forward a recommendation to the Council that formal negotiations on the link to Australia should be opened (Commission 2013). These discussions were terminated when Prime Minister Abbott's dismantled emissions trading in Australia, but the case still provides evidence of a specific form of transnational diffusion: the direct interaction and influence of independent ETS across regions through linking efforts.

Role of other ET drivers

Australian governments have failed for decades to reduce GHG emissions. Explanations have highlighted fossil fuel dependency, the strong opposition of the fossil-fuel industry or carbon lobby to carbon pricing (Crowley 2013b), dwindling public support, and shortcomings in the political strategies employed to constrain the influence of the carbon lobby on Australian climate policy (Bailey et al. 2012). We have seen that the temporary introduction of carbon pricing through the ACPM can be explained by domestic political developments, particularly the collaboration between the Gillard Labour minority government and the Greens. The Labour government drew heavily on the Greens and key independent representatives, ensuring the passage of the ACPM in Parliament with the help of the Greens and the independent representatives (Crowley 2013a).

Key elements of both ACPM and the earlier CPRS were driven by the need to placate domestic political-economy pressures, a process that led to the progressive overlaying of domestically-driven ETS drivers onto features originally stemming from international diffusion, until many became significantly distorted. Both the CPRS and ACPM, for instance, contained comparatively generous and long-lived 'transitional assistance' for *emissions-intensive trade-exposed industries,* to the point where the Green Party voted against the CPRS. Fixed pricing was incorporated into the ACPM largely to counter the Liberal–National coalition, industry and public pressure about the economic uncertainties arising from the ETS, although this backfired when EU ETS prices fell from around €15 per ton to €5 per ton shortly after the ACPM price of $23 per ton was introduced.

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[5] Although, as noted earlier, Rudd announced in 2012 that the transition to a floating price would be brought forward to 2014. This measure was widely regarded as an election manoeuvre intended to quell public criticism of Australia's comparatively high (AUS$23 per ton) carbon price following a decline in EU ETS prices.

Finally, the household assistance package was intended to assure voters that they would not experience adverse economic impacts in response to the Abbott opposition's sustained onslaught on the ACPM and earmarking of 'the carbon tax' as a key issue in the 2013 elections (Newman and Head, 2015).

In sum, the Garnaut reviews proved crucial to the temporary adoption of carbon pricing and to the design of ACPM – but so too did domestic drivers, and with increasing force. Experiences with the EU ETS and carbon pricing elsewhere certainly influenced Garnaut's recommendations for an Australian ETS: therefore, in discussing domestic policy developments we must also take into account international developments and the role of transnational policy diffusion, combined with scrutiny of how these have been shaped by internal influences. It is necessary to consider the *interaction* between transnational diffusion and unique contextual factors to understand the temporary introduction and design of ET in Australia.

Concluding reflections

Australia's temporary adoption of carbon pricing and emissions trading was triggered and shaped by domestic political developments and opportunities, in particular a window of opportunity for influencing climate policy that was seized by the Green Party during the Gillard government. The first Garnaut Review significantly informed the design of the CPRS, which in turn – and along with the second Garnaut Review – informed the ACPM design. While these expert processes and reports proved crucial to the adoption of emissions trading in Australia, the recommendations in the reports had been influenced by experiences with the EU ETS and the movement towards emissions trading in other jurisdictions. This lends support to our exploratory claim that, although domestic triggers have been important to the initiation and shape of emissions trading in Australia, transnational policy diffusion has influenced adoption decisions as well as decisions about key design features.

3.3.4 Revising the EU ETS: More external experiences to learn from?

Key design changes made to the ETS for phase III

The pilot phase of the ETS did not function well, with a sharp price drop in 2006 and a carbon price close to zero in 2007. Hence, when the design rules for the third phase (2013–2020) were to be decided in 2008, significant changes were adopted (see Skjærseth and Wettestad 2010).

- **Type of system:** As to intra-temporal safety valves, banking was now allowed between phases. The governance level was more clearly supra-national, with greater harmonization and far less leeway and authority given to member-states.
- **Ambition level: A** common cap was established for the ETS (a 21% reduction by 2020, in relation to 2005), linked to the overall 20% reduction target. A linear reduction factor was introduced, reducing the number of allowances each year by 1.74%.

- **Sectors, gases and emissions covered:** Some sectors (e.g. aluminium, certain chemicals) and gases (nitrous oxides and perfluorocarbons) were added. Around half of the EU's CO_2 emissions were covered.
- **Allocation mechanism(s):** Auctioning now became the main principle. Initially introduced mainly regarding the power sector, it was gradually phased in towards energy-intensive industries. Free allocations based on benchmarking continued.
- **External offsetting and linking:** There was a certain tightening of the room for external offsetting, with a cap introduced. Rules were further specified in 2011, when a ban on the use of industrial gas credits (from CDM projects seeking to destroy HFC-23 and N_20 gases) was adopted, to enter into effect in May 2013. As to possible linking with other emissions trading systems, a goal of a linked OECD market by 2015 was adopted in 2009.
- **MRV and enforcement:** A single registry was to be introduced. The level of penalties was the same as in phase II: 100 euros per tonne.
- **Price management:** As a mechanism for countering extreme price fluctuations, a clause was introduced: in the case of six consecutive months with a carbon price more than three times the average during the two preceding years, the Commission was to convene a committee meeting (Art. 29a).
- **Revenue earmarking**: A recommendation to use half of auctioning revenues for climate change mitigation and adaptation measures; further, 10% of the auctioning revenues should be redistributed from high-income to low-income member-states.

The role of diffusion

We have not found studies that provide focused and in-depth information on the role of international diffusion mechanisms. But there are some relevant bits and pieces of evidence. As to learning from others, at this point there was considerable activity around the world which the EU could learn from. There are some indications that Commission officials were what they call 'inspired' by the developing US federal climate change legislation at the time, the Waxman–Markey Bill. In particular, the introduction of the linear reduction factor was inspired by such an element in Waxman–Markey (which stalled in 2010) (Wettestad 2014; on Waxman–Markey, see e.g. Skocpol 2013).

With regard to the competition mechanism, it seems clear that the continued lack of relevant similar policies in main economic competitors in the West (the USA) and the South (China, India) provided strong legitimation for the campaign conducted by particularly energy-intensive industries for continued free allowances also after 2012. A key concept was the threat of 'carbon leakage' (see Skjærseth and Wettestad 2010; Dreger 2014).

Other shaping factors

Also this time around stakeholder consultations, with meetings in a specific ETS WG under the ECCP II as particularly important, played a central role in shaping the design changes. Negative experiences with the initial design – with cumbersome national processes open to lobbying and a plummeting carbon price – led a majority of EU member-states to prefer a more centralized and harmonized system, more based on auctioning.

3.4 Fourth wave and 'advanced polycentrism': China, but also further reform of the EU ETS and the South Korea ETS

3.4.1 Introduction

A key development in this phase has been the turn to emissions trading in China, the world's biggest greenhouse gas emitter, where seven sub-national pilot systems have been established and a national system is on the drawing board. There are also interesting developments elsewhere, as with smaller systems established in countries as diverse as Kazakhstan and Switzerland, the South Korean ETS established in 2015, and countries such as Brazil and Mexico considering the introduction of emissions trading (see e.g. ICAP 2015; World Bank 2015). And further reform of the EU ETS is being carried out.

3.4.2 China: 'Turning the tanker' with outside help?[6]

Brief overview of evolution

The roots of ET in China go back to the late 1980s and experiments with water pollution – in particular, sulphur dioxide (SO_2) systems from the mid-1990s onwards (see Shin 2013). Within the climate and energy context, an important development took place in November/December 2009, when the Chinese government announced a carbon-intensity reduction target of 40 to 45% by 2020 (with 2005 as base year), broken down into 17% in the 12th Five Year Plan (2011–2015) and implicitly a further 23 to 28% in the 2016–2020 Plan. The next milestone was the National Development and Reform Commission (NDRC)'s designation of 13 low-carbon zones in the autumn of 2010 (in five provinces and eight cities), with encouragement to consider ET as a key policy instrument. This was followed up by announcements during autumn 2011, by both the State Council and the NDRC, designating five municipalities (Beijing, Tianjin, Shanghai, Chonquing and Shenzhen) and two provinces (Hubei and Guangdong) for the establishment of pilot ETS. The Shenzhen pilot began operating in June 2013, followed by three others in late 2013 (Beijing, Guangdong, Shanghai), and the remainder in 2014. There are significant similarities and differences in design, as shown below. As to similarities, the systems are based on a complex combination of intensity targets and absolute caps. The differences include

[6] The 'tanker' metaphor is borrowed from Sandbag (2012).

coverage, price management mechanisms, and penalty systems. In autumn 2014, the NDRC announced that a national ETS in China would be established in 2016.[7]

Key design features of the pilot systems: similarities and differences

Analysts have paid particular attention to the three longer-running systems of Guangdong, Shanghai and Shenzhen, seeing these three as most likely to serve as models for the coming national system (see e.g. Munnings et al. 2014: 15). Although some caution is required, as information and figures vary somewhat in the available studies, here is a summary of the main picture:

- **Type of system:** There is a rather complex combination of absolute caps and intensity targets. For instance, Shenzhen has both an overall cap on carbon intensity and absolute emissions in the 2013–2015 period, and carbon-intensity targets for individual entities covered (Munnings et al. 2014: 18). As the caps emerge bottom–up from sector-level benchmarks, the systems must be seen more as baseline-and-credit systems than as 'classic' cap-and-trade systems. There are no intra-temporal safety valves. The governance level is generally sub-national, but there is also some variation, with (five) provinces and (two) cities.
- **Ambition level:** The intensity targets range from Chonguing and Hubei at 17% to Shenzhen at 21% by 2015. In addition, all systems have unique, specific rules regarding the type of cap adopted and cap schedules (Munnings et al. 2014: 17; CDC Climat/ IETA 2015: 9).
- **Sectors, gases and emissions covered:** All pilots include a common core: the electricity sector, iron and steel, nonferrous metals, petrochemicals and chemicals, pulp and paper, and glass and cement. But there are also some variations, not least with regard to thresholds for inclusion. For instance, Guangdong includes cement, steel, petrochemical industries above a certain threshold and companies in the commercial sector emitting >5,000 tons annually. In total, 211 companies are included, mostly from the electricity, cement and petrochemical industries (CDC Climat/IETA 2015: 9). Shanghai includes companies in the transport sector (>10,000 tons), including in total 190 companies; Shenzhen includes water-supply companies (>3,000 tons) and road transportation, with a total coverage of 832 entities. Importantly, all pilots cover both direct and indirect emissions, with the latter referring to the use of goods in the covered sector, such as electricity. There are also differences in emissions coverage, ranging from 33% of emissions in Hubei to 60% in Tianjin, and the rules for new entrants (Zhang et al. 2014: 11, 13; CDC Climat/IETA 2015: 9).
- **Allocation mechanism(s):** The main mechanism is allocation for free. Some systems conduct annual allocations (Beijing, Hubei), others do a one-time allocation (Guangdong, Shanghai). Allocations

[7] For good recent overviews of policy development and central research contributions, see Zhang et al. (2014) and Munnings et al. (2014).

are based on grandfathering, some sort of benchmarking, or both.[8] Two of the systems auction a rather limited amount of allowances: Guangdong and Shenzhen (around 10% in Guangdong in 2015). Some of the other systems have stated the intention to auction a small amount of allowances (e.g. Beijing).

- **External offsetting and linking**: All systems allow for use of Chinese Certified Emissions Reductions (CCERs), which are mainly 'repurposed' CDM credits. The maximum amount varies between 5% and 10%.
- **MRV and enforcement:** Each of the pilots pursues its own (non-harmonized) protocols for measuring, reporting and verifying carbon emissions. As to penalties, the Guangdong system sets fines at three times the average allowance price for any difference between emissions and 'retired allowances'; Shenzhen has a somewhat similar 'three times the average market price' mechanism, whereas Shanghai has a penalty band ranging from 50,000 to 100,000 yen) (Munnings et al. 2014: 15–16). Shenzhen also operates with positive incentives in the form of bonuses for additional reductions.
- **Price management:** Several systems include various price management provisions. Guangdong has a price floor; in Shanghai prices cannot vary by more than 30% in one day; Shenzhen has what has been termed a 'symmetric safety valve' (Munnings et al. 2014: 28). There are also some flexibility mechanisms included in the allocation systems. For instance, Guangdong has an allowance reserve of approx. 17 million tons. Shanghai regulators can issue additional allowances, or withdraw some, compared to entities' performance against benchmarks.
- **Revenue earmarking**: In Guangdong, the authorities plan to recycle auction revenues to support low-carbon and energy-saving investments (Munnings et al. 2014: 21).

Thus, we find significant similarities in design. But there are also numerous differences, particularly as regards more detailed specifics and thresholds, including the coverage of sectors and enterprises, rules for offsets, and MRV and enforcement.

What do we know about the role of diffusion in shaping designs?

The literature on the evolving emissions trading in China is increasing rapidly (see e.g. Miao 2013; Jotzo 2013; IETA 2013; Lo and Howes 2013; Environomist 2014; Munnings et al. 2014; Quemin and Wang 2014; Zhang et al. 2014; CDC Climat/IETA 2015; Lo 2015; Tung 2015). Several of these studies use experiences from systems like the EU ETS, California, and Australia as a backdrop for discussing the emerging Chinese systems.

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[8] The overall picture is quite complex. For instance, in the case of Shanghai, energy-intensive industries and buildings receive allowances based on grandfathering, while benchmarks are used for the electricity sector. (Munnings et al. 2014: 24–27.)

What then do we know about the role of various diffusion mechanisms in shaping the Chinese pilots and their similarities and differences? Central studies indicate a certain role for learning. First, there is evidence that the MRV systems in particular have been shaped by 'international experience' – primarily that of the EU ETS. MRV guidance documents refer explicitly to EU documents (as also to ISO standards and IPCC inventory), and the registry systems have been copied from the EU ETS (Li 2013; Zhang et al. 2014: 5, 13). Some studies mention specific meetings and discussions between EU and Chinese officials, and funding both from the EU centrally and governments like those of Germany and the UK, as mechanisms for such learning from 2010 on (Sandbag 2012: 22; Biedenkopf and Torney 2013; Gippner 2014). Several studies point out that an important stimulus for turning China towards emissions trading has been experience with flexibility mechanisms through the implementation of numerous CDM projects in China (see Shen 2014).

More generally, we can note some striking similarities between the initial EU ETS design and the Chinese pilots, with regard to the common core of industries covered, the initial dominance of free allocation, and the penalty systems in pilots like the Guangdong and Hubei systems (three times the average market price). What about the functioning of bilateral and multilateral assistance efforts so far? In developing a national registry the NRDC has collaborated with the UNDP in a joint project from 2013 on (IETA 2013: 9). As the IETA notes, 'due to the multitude of different systems which is thereby being created, cooperation between the national registry and local registries will be critical' (IETA 2013: 9).

What about the mechanism of competition? Previous studies have emphasized the weight that the Chinese authorities attach to independence and their explicit unwillingness to adapt to any sort of international pressure in this issue area. However, the prominence of energy-intensive and trade-exposed industries like steel, cement, and aluminium, with the related need to protect the interests of these industries, has been noted as a factor likely to influence the design of Chinese emissions trading (Munnings et al. 2014: 10).

Other key factors shaping design

As Lo (2015:2) notes: 'The majority of the existing mandatory ETSs operate in mature market economies safeguarded by a liberal democratic regime. In contrast, China is a developing market economy with socialist political legacies'. On the whole, more is known about the various internal factors than the external ones; shedding light on the turn to emissions trading and shaping the choice and design of the pilots. In explaining the ET turn, studies point to key internal factors such as a troubling development of energy intensity in the first years after 2000 and experience with expensive command-and-control measures for fulfilling previous energy intensity targets (Zhang et al. 2014).

Why then these seven entities, and why certain regions and cities? Several factors have been put forward to explain this choice: one factor is the conscious wish to include differing entities, in order to gain experiences that can reflect the actual variation among China's provinces and regions in terms of economic scale, GDP and emissions per capita (e.g. EDF/IETA 2014c: 4). Furthermore, there is the tradition of *shidian*, pilot projects/policies implemented in parts of the country prior to national policies, referred to as a well-established concept applied in Chinese policymaking. In addition, most pilots had been previously selected as low-carbon pilot areas (Zhang et al. 2014: 2,7).

Concerning design similarities, the coverage of both direct and indirect emissions seems to have much to do with the regulated electricity prices and dispatch. This hinders utilities from passing along their emissions/allowance costs in the same way as for instance within the EU ETS. The inclusion of consumption and hence indirect emissions is intended to counteract this problem (Munnings et al. 2014; *Scientific American* 2014). Furthermore, penalty levels are held to be quite low: an important reason cited involves pre-existing rules at a higher administrative level that cap the level of such penalties (Zhang et al. 2014: 14). As to the establishment of price-management mechanisms, the NRDC has applied such mechanisms earlier, in connection with CDM activities.

How then account for differences in design? An important causal factor indicated here is Beijing's deliberate wish to test out differing designs, in preparation for the coming national system (Jotzo 2014). Furthermore, the absence of a national law on emissions trading gives the provinces little incentive to coordinate their activities (Zhang et al. 2014).

Concluding reflections

As to performance, market activity so far has been limited, and analysts have pointed to a 'very low liquidity market' (Munnings et al. 2014: 30). Furthermore, some compliance deadlines have been delayed and adjusted. However, given the numerous challenges, performance may very well be as adequate as could be expected. Let us sum up what analysts see as the main challenges for successfully implementing emissions trading in China:

- Lack of clarity as to the legal status of the pilots has been pointed out, seen in relation for instance to 'higher-level' carbon-intensity targets;
- Lack of clarity/transparency of the cap-setting processes, including also the uncertainty introduced by the possibilities for within-period cap adjustments;
- A need for clarification of the relationship between emissions trading and other (pre-existing) policies and policy instruments, including pre-existing and lax non-compliance fee levels and the announced carbon tax. As noted by the IETA, 'the biggest challenge at the moment and up until 2016 will be up to policymakers to simultaneously decide the coverage of a national carbon market and imposing a carbon tax' (2013:15-16).
- Regulated electricity prices and dispatch hinder utilities from passing along their emissions/allowance costs and the general operation of the carbon price signal. It is uncertain how the inclusion of both electricity production and consumption will help here.

- Lack of reliable data and transparent, independent reporting. Studies emphasize that many entities have not yet established emissions inventories; statistics accuracy needs to be strengthened; and independent verification of annual emissions reporting 'will need to be established' (Zhang et al. 2014: 7; *Scientific American* 2014). The protocols suffer from issues of data quality and quantity. 'Beyond national level emissions data, regulators at local levels have not collected data at the facility level for very long' (Munnings et al. 2014: 14).
- The incomplete division of labour between key actors in China's emissions trading institutional set-up has been noted: between the National Development and Reform Commission (NDRC), the Ministry of Environmental Protection (MEP, the State-owned Supervision and Administrative Commission of the State Council (SASAC), and the China Securities Regulatory Commission (CSRC). The MEP has not been a 'major stakeholder' in the development of the pilots so far, but will need to come in more forcefully in the development of a national system (see IETA 2013:18).
- Clarification of the relationship between the existing pilot systems and the possibilities for linkages, and the relationship between the pilots and the announced national system. Analysts have asked whether it might be wise to wait slightly longer than till 2016 to establish a national system, to allow more time for getting laws and institutions in place and experiences from the pilot systems to emerge (see Tung 2015).

3.4.3 Further reform of the EU ETS and the launch of ETS in South Korea[9]

Further reform of the EU ETS is closely linked to severe problems in the wake of the financial crisis from 2009 on, which brought far less need for allowances than anticipated. As also the growth of renewables and the considerable use of CDM credits contributed to a weakening of the demand for allowances, a significant surplus of allowances started to build up in phase II of the system, depressing the carbon price (Wettestad 2014). Given the possibility of banking allowances from phase II to phase III, the increasing surplus had grave implications for the dynamics of the system in phase III. This development led the Commission to initiate a further reform process in 2012, even before the 'revolutionary changed' phase III had started. As the key symptom of the problems was the low carbon price related to the overly low fundamental ambition of the policy in a different economic and political situation than anticipated, the reform process has come to focus on the two central design properties of price management and ambition level. (The latter is post-2020, and will not be further discussed here).

[9] There are also numerous other relevant carbon-pricing processes underway. See e.g. IETA 2014 and World Bank 2014.

As to price management, although more strictly price-focused measures like the establishment of a price floor have been part of the discussion (see Commission 2012), the process has come to focus on two key quantity-focused measures, one temporary and one structural. The temporary one goes under the name of 'backloading', and refers to the postponement of auctioning of 900 million allowances towards the end of phase III (2019–2020). This measure was adopted in the summer of 2014. The key structural measure is the establishment of a 'Market Stability Reserve' (MSR) from 2019 on, proposed by the Commission in January 2014. The MSR is intended to withdraw allowances automatically if the surplus becomes higher than a pre-set level, and to release allowances if the surplus drops below a corresponding low level.To what extent and how this reform process has been shaped by the various diffusion mechanisms will be further explored in one of the in-depth case studies in the ETS DIFFUSION project.

The system in South Korea, which started operating in January 2015, was initiated in the wake of the 2009 Copenhagen climate summit (EDF/IETA 2014d). It is a cap-and-trade system, with the cap set at 4% emissions reductions by 2020 (in relation to 2005). The system is to operate in three phases, with the first running until 2017. It includes some 525 large emitter companies in the power and several energy-intensive industry sectors. Around 60% of total GHG emissions will be covered. Free allocation will dominate in the beginning, with auctioning gradually increasing. The yearly number of allowances in the first phase, around 500 million, makes it a system equal in size to that of for instance Germany. There is scattered evidence to indicate that political entrepreneurs have 'modeled the South Korean system on the EU ETS' (EDF/IETA: 1).

4 Conclusions

Not surprisingly, given the frontrunner and comparatively long history of the EU ETS, more is known about emissions trading in the EU than in the other jurisdictions we have examined. Particularly the initiation of the EU ETS is well documented, which also facilitates singling out the contribution of diffusion in relation to other causal determinants.

Our review lends support to the observation made by Paterson et al. (2014) that more is known about why authorities around the world have turned and are still turning to emissions trading as such, than why they choose more specific designs. Another observation from our cases, and our eight focused design properties, is that comparing design choices is a demanding task in itself. Most of these cases have involved massive amounts of detail, and the need for further more in-depth analyses becomes even clearer. Still, even a fairly cursory overview like the one presented in this report reveals interesting similarities as well as differences in design.

The general picture to emerge from this review is that there are basic similarities for most of the design properties that we have focused on, but important differences in their more specific elaborations. Five key observations stand out regarding design choices and policy diffusion in the cases examined here.

First, as regards ET *coverage*, almost all trading systems cover the large and relatively easily monitored emissions from the power sector. The core sectors and activities now included in the EU ETS – power producers and energy-intensive industries such as steel, cement and pulp and paper – are covered by most other systems examined here, including the Chinese pilot systems. Uniquely, the Chinese pilot systems also seek to cover consumption and indirect emissions. Moreover, all systems examined have included a first ‘pilot’ phase, reflecting the acknowledgement that it is necessary to adjust the systems based on lessons learned from experience. Moving from the pilot phase to subsequent phases, most systems have gradually expanded their coverage of sectors and industries.

Second, regarding *allowance allocation* it is striking (but not surprising) to see that all systems start out with a mix dominated by free allocation, with auctioning becoming stronger over time. Among the systems examined here, only RGGI introduced full auctioning from the very beginning – but system covers only power producers. The possibility of beginning an ETS by distributing allowances for free and gradually introduce auctioning is one of the flexibility features that make emissions trading an especially attractive option for policymakers. There are also some indications of policy diffusion from one jurisdiction to another. For example, the EU’s experience with free allocation and windfall profits informed Australia’s decision to begin with a higher share of auctioning and possibly the decision in California to introduce some auctioning of allowances from the inception of its cap-and-trade programme.

Third, as to *price management*, two widely used mechanisms are to introduce a price ceiling or to establish a price floor. California has a quite complex price floor system based upon the implementation of an auction reserve price, as does RGGI on the US East Coast. Also some of the Chinese pilots include price floor mechanisms, as well as other price management mechanisms. The first phase of Australia's Carbon Pricing Mechanism was based on a fixed price. The intention was to replace the fixed price with a price ceiling in the second phase, which would have been removed in the third phase. Hence, the Australian ETS would have gradually allowed greater volatility in the carbon price through the removal of price management mechanisms. Similarly, New Zealand also introduced a price ceiling in its first, pilot phase.

Fourth, regarding *offsets*, all the systems examined here provide for access to some types of credits to cover obligations, although quantitative and qualitative restrictions on their use vary. For example, different quantitative restrictions prevail across trading systems, with the Californian system having relatively strict quantitative restrictions for the use of credits to cover obligations. Different qualitative restrictions also apply across the systems examined here. For example, whereas the EU ETS allows for only a very limited use of credits from land use, land-use change and forestry, California and Australia (and New Zealand) allow for the use of credits generated by forest and land-use projects. Hence, we see that although different restrictions apply, all systems provide for access to at least some types of offsets. This suggests that there have probably been policy diffusion across jurisdictions, which also is related to the flexibility mechanisms in the Kyoto Protocol and the establishment of various international carbon offset standards and markets.

Fifth, all systems examined have established procedures for *MRV (monitoring, reporting and verification) and enforcement*. Most trading schemes have established emissions-trading registries to enable monitoring of trade in allowances, and have introduced third-party verification and enforcement mechanisms. Indeed, only one ETS to date, that in Kazakhstan, was introduced without any systems in place for MRV and enforcement (Van Asselt forthcoming 2016). Regarding policy diffusion, we have noted how some US emissions trading schemes appear to have drawn lessons from the EU ETS about the need for having solid and secure baseline data to avoid over-allocation and windfall profits, and even fraud.

Dominant diffusion theory, emphasizing design convergence as a sign of diffusion, would lead us expect a significant causal role for diffusion for all the basic similarities we have identified. Evidence examined in this report gives some support to this. For instance in both the Australian case and the Chinese pilot systems, there have been meetings and cooperation programmes that have probably functioned as venues for learning. This is also supported by scattered interview evidence. We have also noted how policymakers in California interacted with EU ETS experts and learnt from the EU's experiences with emissions trading. However, we have also found evidence indicating diffusion and learning as a cause of design *differences*. The prime case here is California, with both MRV and price management properties apparently designed so as to avoid perceived weaknesses in the EU ETS. This dynamic may also be relevant for understanding some choices made with China's pilot system.

On this background, several key knowledge gaps can be identified:

- Systematic, in-depth, and comparative scrutiny of design properties.
- Detailed, in-depth knowledge of determinants of specific design choices, both internal and external to the systems. Much is known about the initiation of the EU ETS, but otherwise knowledge is scattered and limited.
- Systematic application of diffusion theory to identify the significance of central diffusion mechanisms, exploring the significance of learning and adaptation mechanisms. As yet, we have only scattered pieces of evidence about the role of learning, and even less is known about the role of the mechanism of adaptation to altered conditions.
- Studies have paid relatively high attention to governmental bodies and agencies. Less is known about non-state actors as 'learning and shaping agents', both industry and ENGOs.
- Especially relevant for the case of China (and other 'non-Annex 1' countries): we know very little about the coordination of assistance/ learning processes in this field, involving actors like UNFCCC, ICAP, the World Bank, UNDP, IETA and others, as well as the coordination between multilateral and bilateral processes.

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Fridtjof Nansens vei 17, P.O. Box 326, NO-1326 Lysaker, Norway
Phone: (47) 67 11 19 00 – Fax: (47) 67 11 19 10 – E-mail: post@fni.no
Website: www.fni.no