TOWARDS A GLOBAL CARBON MARKET

# PROSPECTS FOR LINKING THE EU ETS TO OTHER CARBON MARKETS

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# Executive summary

Jurisdictions with carbon markets currently account for about 40% of global economic activity (GDP)[1]. Linking these different carbon markets with the ultimate goal of establishing a global carbon market is seen by many as an integral part of the future climate regime, since it can increase the pool of mitigation options available, thereby reducing costs and allowing countries to increase their climate ambition. These benefits however only materialize if the linked carbon markets have a similar level of ambition and a similar design for a number of key features, such as price controls, quantitative and qualitative restrictions on carbon offsets, and the type of allocation method. Paradoxically, while lower abatement costs are an important economic motive for linking two emission trading systems, they can also constitute a significant political barrier, since citizens of the higher cost system might be reluctant to pay for emission reductions in the other jurisdiction.

An analysis of seven existing carbon markets shows that the experience from linking the carbon markets in California and Quebec can provide valuable lessons for any future linkages. Notably, the two regions had very similar policy designs of their carbon markets before linking in 2013 because both Quebec and California are part of the Western Climate Initiative, which is a regional collaboration among several jurisdictions. Moreover, in both regions, carbon pricing is only a support measure to increase the effectiveness of complimentary climate policies that allow the governments to retain a degree of control over their climate standards. In addition, several safeguards were introduced in the linked system, including an auction floor price to guarantee a minimum carbon price and holding limits that restrict the amount of surplus allowances that participants can hold to bank for future use.

The analysis of the design features of emissions trading systems in other parts of the world also shows that other ETS have already learnt from the lessons of the EU ETS, especially how to avoid the build-up of a substantial oversupply of emissions allowances depressing the carbon price to very low levels. Other existing ETS have for example introduced measures such as a floor price on allowances sold at auction and safeguards against the accumulation of a large amount of surplus allowances.

**It is now time for the EU ETS to learn from these experiences and:**

1. Apply positive lessons from the California-Quebec linking, such as:
    - Only allowing the EU ETS to be linked to jurisdictions when there is mutual trust and a close cooperation. Linking requires ongoing harmonization of the climate standards in each jurisdiction, which means that the jurisdictions need to work closely together on potential changes to their regulatory framework.
    - Introducing complimentary policies to the EU ETS allow EU governments to retain a degree of control over their climate standards after linking.
2. Permanently address the oversupply of emissions allowances in the EU ETS by adopting similar measures as other markets, such as limits on the amount of surplus allowances that participants can bank for future use or a mechanism to reduce future caps for banked surplus allowances.

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# Introduction

The number of regions and countries that are putting a price on carbon pollution is vastly increasing. China, for example, announced that it will roll-out a national carbon market from 2016 onwards, South-Korea's national cap-and-trade system started early 2015 and South Africa will implement a carbon tax from 2016.

At the international climate summit in Paris in December 2015, countries are aiming to agree on a new international climate deal. Although the role carbon markets will play under a new climate deal is still unclear, numerous parties — including Japan, the United States, Norway and the EU — see an important role for carbon markets in the future agreement. However, international negotiations of how such markets could transfer emission units have been stalled for the past few years for a number of reasons. These include that countries want to first see the ambition levels and climate finance pledges for the Paris climate treaty before deciding on the role of carbon markets, different views on the type of accounting and monitoring rules at international level, and the general opposition of some countries that do not see a role for carbon markets altogether.

The difficulties of the top-down climate negotiations with the aim of agreeing on a successor for the Kyoto Protocol have led parties to shift their focus to the development of bottom-up carbon pricing policies like regional carbon markets. Such initiatives are also encouraged by several EU Member States through the World Bank's Partnership for Market Readiness (PMR), an initiative for preparatory work and capacity building to establish carbon markets in emerging economies. EU Member States provide the vast majority of finance to the PMR and have already mobilized 50 million dollars[2], with funds coming from Denmark, Finland, Germany, Netherlands, Spain, Sweden, the United Kingdom and the European Commission.

Observers therefore predict that the future global climate treaty will embody a hybrid climate policy architecture. Such a hybrid architecture would combine top-down elements, such as for monitoring, reporting and verification, with bottom-up elements, such as the INDCs (intended nationally determined contributions). Some argue that linkages among the regional, national and sub-national climate policies are necessary to make such a system more effective[3]. One of the first attempts to link existing carbon markets is currently being negotiated between the EU and Switzerland.

This report explains the main benefits and risks of linking, provides information about the key design features for linking different carbon markets, looks at successful and failed attempts of linking carbon markets, and assesses the compatibility between the EU ETS and carbon markets in other jurisdictions.

# Benefits and risks of linking carbon markets

The main benefits and risks of linking carbon markets very much depend on how much the key design features of the systems are harmonized, for example, if there is a similar level of ambition. The next chapter deals with the importance of ETS design features for linking carbon markets, while this chapter provides economic and political arguments in favor and against the linking of carbon markets.

## Benefits of linking

One of the main cited advantages of linking carbon markets is that it **facilitates cost-effectiveness**, that is, the achievement of the lowest-cost emission reductions across the set of linked systems. This could lower the overall costs of meeting the collective cap, since more reduction options are available in the larger system. Linking enables companies to capture a wider range of mitigation opportunities to keep costs down, by widening the geographic scope across national borders.

There could also be other, economic and political, opportunities associated with linking.

**Examples of economic advantages:**

- To the extent that linkage reduces carbon price differentials across countries or regions, it also **reduces competitive distortions** between the regions caused by "leakage".

- Linking can **enhance price stability** which improves certainty for investors, as price variations and shocks within one system can be absorbed and cushioned within a larger overall market.

- Linking can bring **administrative benefits** that come from sharing knowledge about the design and operation of a carbon market.

- Linking could **enhance the liquidity** in the carbon market. This is especially relevant for smaller countries or regions, where it might be difficult to establish an own effective ETS as there are too few players for a transparent price finding mechanism.

**Examples of political advantages:**

- Linking could **signal international collaboration** and a commitment to long-term climate policy and multilateralism. This may in turn provide larger predictability for investors. One of the main arguments for allowing linkages in the UN climate change regime is that by reducing costs, linkage could allow countries to adopt more ambitious policies.

There are also domestic political benefits, because leaders can point to linkage as a sign of momentum for increased participation in carbon pricing systems similar to their domestic climate policies. Linking can increase the ability to **demonstrate global leadership** and show the political benefits from supporting global action on climate change.

## Risks of linking

Depending on a number of parameters, there are also risks associated with linking that could reduce the potential to improve the cost-effectiveness of a pair of linked climate policies. Linking carbon markets can **only enhance the effectiveness of the overall system if there is sufficient environmental integrity** in both

markets. If not, loopholes could be exploited throughout the system, damaging the cost-effectiveness of the full set of linked carbon policies.

There could also be other risks, economic and political, associated with linking.

**Examples of economic disadvantages:**

- Linking can have **significant distribution implications** between and within the jurisdictions. Buyers of allowances in the jurisdiction with the lower pre-link price will be hurt by the allowance price increase that results from the linkage. The sellers of allowances in the jurisdiction with the higher pre-link allowance price will also be hurt, because linking will decrease the carbon price. For the jurisdiction that faces higher prices before linking, this means greater transfers from buyers to sellers. In addition, money will flow from the carbon market with the higher ambition level to the one with a lower ambition level. In case the EU ETS links to a carbon market with a lower pre-link price, EU governments will see their auctioning revenues reduced compared to the situation before.

- If a system with a high carbon price links with a system with a lower carbon price, the firms in the system with higher abatement costs will have less incentives to find innovative ways to reduce their emissions, since they can opt instead to purchase allowances at the new lower price. The result may be **less technological innovation** than expected under the carbon pricing policy pre-linkage.

- **Price volatility** from the other system **might be imported**.

**Examples of political disadvantages:**

- Linkage can **undermine the environmental integrity** of the carbon pricing policies. There are concerns that linking could introduce a **perverse incentive for allowance sellers to relax their cap** in order to sell more allowances, and as a result increase their revenues.

- Linking can lead to **less overall abatement** compared to the situation where the carbon market are not linked, **if one of the systems is over-allocated** with surplus allowances that would otherwise be retired or unused. Assume for example an over-allocated system A in which business-as-usual emissions are 100 while 120 allowances are allocated. In the absence of linking, this system will emit 100. Then assume a system B that is short of 30 allowances, since its business-as-usual emissions equal 130 while only 100 allowances are allocated. If the two carbon markets are linked, system B will fully absorb the surplus allowances from system A, which means that together they will emit 220 emissions, while without linking the emissions would be only 200.

- Linking could raise political concerns because linkage could mean fewer domestic emission reductions. This could be seen as problematic since **domestic mitigation provides co-benefits** unrelated to climate change, such as reduction of local air-pollutants.

- A problem of linking two systems with different political objectives may be the loss of control and compromising of the original policy priorities in each system. With linking, the scope for regulatory interventions of the single system is reduced and linking hence presents the political challenge of **ceding some degree of national autonomy.**

# Important design features of linking carbon markets

Linking allows companies to purchase and use allowances from another emissions trading system for their compliance obligations[4]. Linking does not require all design features to be identical, however differences in certain design features may undermine the original objectives of the system and thereby make it more difficult to link to the other system. The relative stringency of targets, the recognition of carbon offsets and the price or supply controls are key design features that require some form of harmonization before linking can take place[5], because they will have a considerable impact on the climate policies of each system.

## 1. Stringency of targets

The level of the cap is of crucial importance when linking carbon markets because it is a key determinant of allowance prices, the size of efficiency gains from linking and distributional effects from linking. Paradoxically, the difference in abatement costs, reflected in the allowance price, is an important economic motive for linking two emissions trading systems, but may also constitute a significant political barrier[6] due to the associated transfer of capital between the jurisdictions.

Significant differences in the stringency of targets may lead to large differences in the (pre-link) carbon prices in the different carbon markets. If these two carbon markets with different ambition levels are linked, the allowance price in the low-cost system will be raised while the allowance price in the high cost system is reduced. On aggregate, money will flow from the carbon market with a higher ambition level to the one with a lower ambition level. Citizens in the high cost system may be very reluctant to pay for emissions reductions in the low cost system. On the other hand, if allowance prices are very similar in the two systems, there will be little economic gain in linking.

Figure 2 shows how linking a high ambition system (system 1) to a low ambition system (system 2) will result in increased emissions in the high ambition system and a transfer of funds from the higher to the lower ambition system.
Other reasons why the level of ambition is important when linking ETS[7]:

1. To avoid that other ETS relax their cap to create additional revenues.
2. To persuade regions with less stringent targets to adopt tighter goals. Policymakers in a region with more ambitious climate policy goals might be reluctant to link unless cap levels are in line with some accepted burden sharing rule.

3. To ensure that the overall cap of an international carbon market corresponds to a global emissions trajectory that is in line with limiting warming to no more than 2°

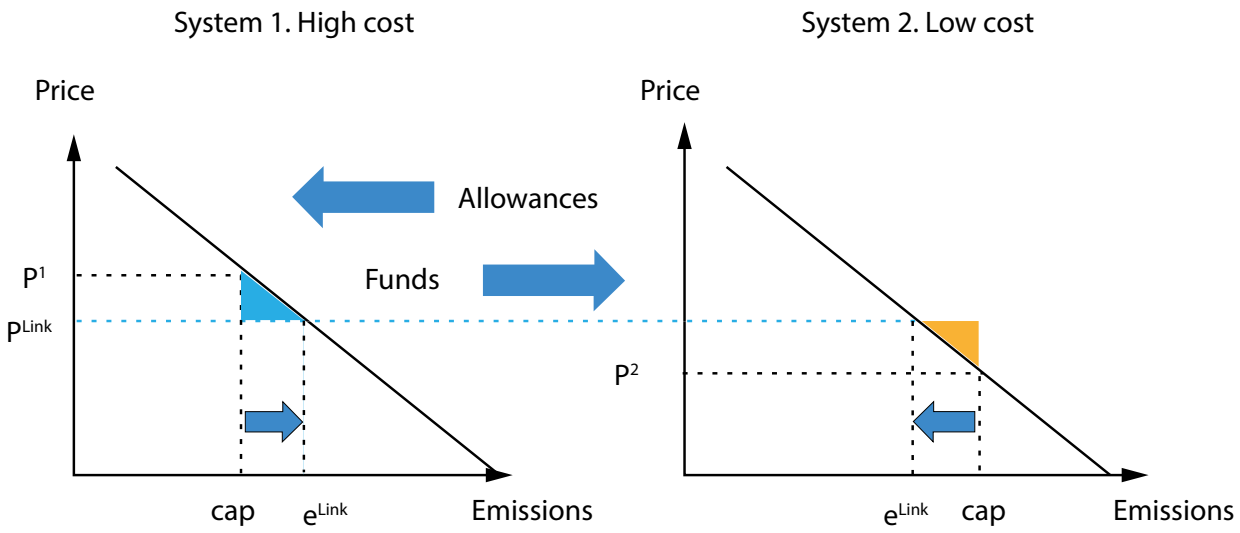


Figure 2: The effects of linking two carbon market with different targets (Zetterberg, 2012)

## 2. Recognition of carbon offsets

Besides the setting of the overall cap, the qualitative and quantitative limits for carbon offsets directly influences the price level of a carbon market and thus the amount of domestic mitigation efforts. One consequence of linking is that offsets available in one carbon market also become available in the linked carbon market even if that system restricts its use.

After 2020 the use of international offsets will not be allowed in the EU ETS anymore as part of the at least 40% domestic emission reduction target. However if a carbon market that is linked to the EU ETS does accept carbon offsets, these credits become available indirectly in the EU ETS as well. This is because their use in the other carbon market sets domestic allowances in the other carbon market free for sale.

If offsets that are allowed in one system are not allowed in the other, these offsets will still have an indirect impact on the other system since allowances and offsets are interchangeable. This way the political decision in the EU ETS to restrict the use of offsets has been bypassed, unless the linked carbon market does not allow for the use of carbon offsets as well.

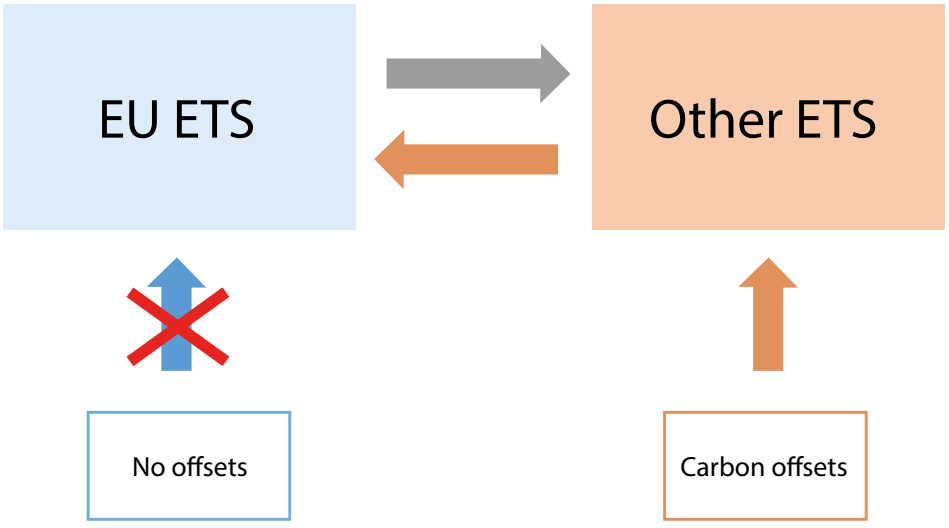


Figure 3: The effects of linking two carbon market with different carbon offset policies

## 3. Price or supply management

Provisions for price or supply management could be introduced in carbon markets to address imbalances between the demand for emission allowances and the supply of these allowances. These provisions are of direct relevance when linking carbon markets, as they would automatically apply to both linked systems.

If a price ceiling (or floor) is available in one system, it will after linking become available in the other system too, regardless if the other system acknowledges the price ceiling or not. Even if the price cap applies only to one of the systems, after linking the price cap provides an upper limit on the price in both of the linked systems. This is because the participants of the carbon market without a price ceiling are also able to buy allowances from the other carbon market at the price ceiling level.

The EU is currently discussing a legislative proposal to establish a Market Stability Reserve for the EU ETS. The reserve would operate on predefined rules and addresses supply-demand imbalances by adjusting auction volumes, rather than by directly managing prices. Allowances are put in the reserve and auctioning volumes are reduced, when the surplus of allowances is above a certain threshold. At times of scarcity on the EU's carbon market, allowances are released from the reserve and auctioning volumes are increased accordingly. The EU's proposal for a Market Stability Reserve impacts linking with other carbon markets in the following ways:

- Ideally the Market Stability Reserve applies to both the EU ETS and the linked carbon market by adjusting auctioning volumes in both carbon markets based on the relative over- or undersupply of the combined systems. Otherwise, the reserve reacts on parameters from only part of the market and becomes less effective in addressing demand-supply imbalances. The reserve should look at the difference between emissions and supply of allowances in both of the markets, since allowances between the two linked markets are interchangeable. Otherwise allowances might be released from the reserve even though on balance there is no scarcity of allowances (and vice versa).

- The Market Stability Reserve impacts the ambition level of the EU ETS and therefore no absolute emission cap can be guaranteed for a certain trading period. This has direct implications for the linked carbon market. The auctioning volumes are not fixed in the EU ETS as a result of the Market Stability Reserve which means that the amount of allowances available on both carbon markets, and hence the stringency of the overall cap, cannot be anticipated at the start of the trading period.

## 4. Distribution of allowances

In general, the method of allocating allowances to participants has significant implications for the distributive and environmental impact of the carbon market. However, there should be no such major implications when it comes to linking. This is because the impacts of different allocation methods across systems will equally occur both in absence and presence of linking[8].

There is one exception: linking will change the allowance price of the two carbon markets and can therefore have distributive effects that depend on the method of allocation:

- Free allocation of allowances based on grandfathering[9] or benchmarking: As can be seen in figure 2, the equilibrium price after carbon markets have been linked has been lowered in the high-cost system and increased in the low-cost system. That means that the sellers (companies with spare allowances) in the high-price system lose as a result of the lower carbon price compared to the situation before linking. The same holds for buyers (companies with shortages) in the low-price system that are faced with a higher carbon price compared to before. In contrast, buyers in the high-price system and sellers in the low-price system win.

- Full auctioning of allowances: In this case the distributive effects take place among the different government authorities. The authority in the high-price region will receive less auctioning revenues as the carbon price has been reduced after linking. The authority in the market with a lower pre-linking price will in contrast receive more auctioning revenues.

## 5. Coverage and point of regulation

The sectoral coverage of the carbon market is important as it impacts the availability of mitigation options and the international competitiveness of affected companies. However, these issues arise irrespectively of whether systems are linked or not. Differences in coverage can only indirectly impact competitiveness issues through the change in the carbon price. Harmonizing the range of sectors included in the carbon markets is hence not absolutely necessary for linking to take place. The same holds for the coverage of different greenhouse gases. The calculation of the Global Warming Potential of non-$CO_2$ greenhouse gases should be consistent though.

Linking carbon markets with different points of regulation is not a problem as long as one avoids that products are either covered twice or not at all by the carbon market. This can happen when two systems regulate a product at different stages in the process chain while the respective products are traded between the different systems. For example, upstream treatment of fuels in system A and downstream treatment in system B would lead to double pricing the carbon content of the fuel in case there is trade from system A to system B (and no pricing at all if the trade occurs in the other direction). This problem can be circumvented by excluding the downstream treatment of imported products that are already regulated upstream in the other region.

## 6. Compliance period

Differences in trading and compliance periods will increase the complexity of the overall system but do not present a significant barrier to linking, as long as financial products are available that establish forward prices for allowances.

## 7. Banking and borrowing

Banking refers to the possibility of using allowances from earlier trading periods in later periods. If one system allows banking, this option will also automatically become available to a linked carbon market, even if this market does not allow for banking[10]. That means that harmonization of banking restrictions is a necessary condition for linking carbon markets. Most carbon markets, like the EU ETS, allow for unrestricted banking.

Borrowing refers to the possibility that companies can use future allocations for their current compliance. In particular the borrowing between trading periods can pose problems. Full auctioning cannot be introduced in the future when companies are allowed to borrow from future (free) allocations. Borrowing from future

allocations would also reduce the climate ambition of the current trading period, and affect the integrity of the cap in the short term. Most carbon markets, like the EU ETS, therefore do not explicitly allow borrowing from future trading periods.

### 8. Penalties and enforcement

The penalties for non-compliance must be roughly similar in the linked systems in order to establish a level of trust and confidence. Each system should require the later issuance of non-delivered allowances as a result of any missed target as well as fines that are set at a similar level in the linked systems.

The linked systems should also have a similar compliance regime for enforcement.

### 9. MRV and registry

The measurement, reporting and verification (MRV) standards are important for the integrity of a cap-and-trade system in order to avoid that emissions exceed the cap due to measurement errors or irregularities. The MRV requirements should at least be comparable across the linked systems.

The registries of carbon markets should be made compatible to enable the transfer of allowances across linked systems

## Compatibility between the EU ETS and carbon markets

The chapter looks at the experience of linking carbon markets so far and compares the key design features of systems in other jurisdictions to see how compatible they are with the EU ETS. This is especially relevant for the upcoming link between the Swiss and the EU ETS which would be the first time the EU ETS is formally linked to another carbon market. The earlier linking negotiations between Australia and the EU failed in 2013 when the newly elected Australian government decided to abolish carbon pricing altogether. Quebec and California provide the first success story for linking carbon markets, which was enabled by the regional collaboration under the Western Climate Initiative that already led to some harmonization of the systems in California and Quebec. Other more-or-less established carbon markets include the seven ETS pilots in China, the South Korea ETS, the New Zealand ETS, the Kazakhstan ETS and the US Regional Greenhouse Gas Initiative (RGGI). The prospects for linking these carbon markets with the EU ETS in the future are explored, by comparing the key design features of these systems with those of the EU's carbon market. The table at the end of each section shows the compatibility of these carbon markets with the EU ETS by showing how the design features[11] of these systems differ from the EU ETS.

## On the horizon: linking the Swiss and the EU ETS

In November 2010, the European Commission proposed opening negotiations on linking the EU ETS with Switzerland's carbon market and received a negotiation mandate from Council afterwards. The Swiss linking would be the first formal process to link the EU ETS with a third country's carbon market. Norway, Iceland and Liechtenstein are already covered by the EU ETS through their membership of the European Area agreement. The negotiations with Switzerland were temporarily put on hold when Switzerland voted for the reintroduction of immigration quotas in February 2014. However, in September 2014 a sixth round of negotiations between the Swiss and EU ETS took place with the aim to initial[12] the linking agreement by mid-2015[13].

The Swiss emissions trading system started in 2008 with a 5-year voluntary phase. For the second commitment period 2013-2020, Swiss policymakers have introduced important changes to their ETS which enhanced its compatibility with the EU ETS. Switzerland's 2020 target is the same pledge as the EU: to reduce GHG emissions by 20% compared to 1990 levels.

### Procedures to link the EU ETS to other carbon markets

The applicable procedure to link the EU ETS with other markets is the "Procedure for the adoption of international agreements". It currently allows for the EU ETS to link with any country or administrative entity if the country or sub-national region has a compatible ETS with an absolute cap on its emissions. The procedure sets out the following steps to be followed:

- The European Commission has the right to initiate linking negotiations and conducts the negotiations, acting on the mandate it receives from the Council. The Commission negotiates in cooperation with Member States on a bilateral agreement that allows for the mutual recognition of emission allowances. Since the agreement relates to a field in which the EU has exclusive competence, the Commission is the sole negotiator, although it will involve national experts by reporting to them on the proceedings.
- Once the negotiations are finalized, the Commission and the Council sign the agreement.
- The European Parliament is consulted on the linking agreement and must give its approval.
- Finally, the Council adopts a decision actually concluding the agreement, which is deemed to constitute ratification of the agreement.
- After an agreement has been concluded, the Commission will adopt any necessary provisions to the EU ETS legislation to allow for the mutual recognition of allowances. These measures will be adopted in comitology, which means that the Council and the Parliament can object to the measures if they disagree.
- Under comitology only non-essential elements of a legislative act can be amended. The ordinary legislative procedure (codecision procedure) needs to be followed if the agreement to link the EU ETS with another carbon market requires the EU to change essential elements of the EU ETS directive. In this case the European Parliament is a co-legislator, placed on an equal footing with the Council.

**Swiss voluntary phase: 2008-2012**

In 1999, Switzerland adopted the CO2 act that introduced a CO2 levy for heating, industrial processes and transportation fuels and a national ETS. Initially, the Swiss ETS was designed as a voluntary system that offered companies an alternative to its CO2 levy. As an alternative to paying the CO2 levy, companies could opt to voluntarily set an absolute emissions target that was subject to approval by the federal authorities to receive allowances and participate in the carbon market.

Companies with emissions above 25,000 tCO2e per year were allowed to directly participate in the ETS. Those companies from eligible sectors received free allowances based on a bottom-up approach in which federal authorities assessed the company's potential to reduce emissions from both a technical and economic viewpoint.

During the first phase of the Swiss ETS, companies were furthermore able to use removal units (RMUs) from carbon sink projects such as afforestation and reforestation. These temporary credits could not be banked to future commitments periods though.

The penalty regime under the voluntary Swiss ETS also varied significantly from the EU ETS. Companies failing to comply had to retroactively pay the CO2 levy plus interest. This levy acted as a price cap for the Swiss ETS.

These differences demonstrate that during this voluntary phase, the Swiss ETS was largely incompatible with the EU ETS. The voluntary nature, the design of the penalty regime and the acceptance of temporary offset credits from carbon sink projects would have made linking unacceptable for the EU.

**Swiss mandatory phase: 2013-2020**

The negotiations between Switzerland and the EU to link their carbon markets began officially in March 2011, and Swiss policymakers were made aware of the potential barriers to linkage as a result of the design differences between the two systems. The December 2011 revisions to the Swiss ETS introduced significant amendments to the Swiss ETS as of 1 January 2013 which have increased its similarity to the EU ETS.

One of the most important changes concerns the move from a voluntary scheme to a mandatory one. Sectors with high emissions per installation are now required to participate in the ETS. Harmonization with the EU ETS also happened on other fronts, for example regarding the Swiss penalty regime, the free allocation of allowances and the use of international offsets.

There are still some small differences between the Swiss and the EU ETS. Entities covered by the Swiss ETS are also required to measure their emissions and report them annually to the Swiss authorities. Unlike the EU ETS however, the Swiss ETS does not require the reports to be independently verified. Swiss authorities have instead the right to request independent verification on a case-by-case basis. The Swiss MRV rules correspond to the Norwegian ones so therefore the absence of independent verification of emission reports prior to submission to the national authorities should not pose a barrier for linking with the EU ETS.

The cap setting under the Swiss ETS is also slightly different from the EU procedure. The EU ETS is set by the European Commission, while the Swiss cap is determined bottom-up (e.g. the sum of the caps of the entities covered by the system).

Aviation is also a contentious issue in the EU-Swiss linking negotiations, as Switzerland is reluctant to include this sector under the ETS. The Swiss revised CO2 act gives Swiss authorities however the option of requiring aircraft operators to participate in the Swiss emissions trading system, pending the linking negotiations with the EU. The Swiss authorities have also prepared draft legislation in order to ensure that airline companies collect the data that is required to implement emissions trading for aviation, but this ordinance has not come into force yet[14].

Looking ahead, the Swiss 2030 climate target could potentially pose a significant barrier to linking with the EU ETS. The Swiss submission ahead of the international climate deal to be finalized at the end of 2015 includes a 50% emission reduction target by 2030, of which at least 30% must be achieved in Switzerland itself. The remaining up to 20% should be attained through purchasing international carbon offsets. The EU on the other hand has opted for an at least 40% domestic target, explicitly excluding the use of international credits. How the 30% domestic climate target for the year 2030, in addition to the up to 20% international offsets, is translated into a specific 2030 target for the Swiss ETS is yet unclear.

The table below compares the key design features between the Swiss ETS with the EU ETS

| | Swiss ETS | EU ETS |
|---|---|---|
| Stringency of target | 1.74% annual reduction from 2013 cap | 1.74% of 2008-2012 average annual reduction |
| Overall cap | Absolute cap of 5.6 Mt CO2e in 2013 | Absolute cap of 2,084 Mt CO2e in 2013 |
| Carbon offsets: | | |
| - Quantity | During 2012-2020, participants may use carbon offsets up to a maximum of 11% of allowances allocated during 2008-2012 minus offset credits used in that same time period, or, for new participants: 4.5% of their emissions in 2013-2020. | During 2008-2020, participants may use carbon offsets up to a maximum of 11% of its 2008-2012 allocation, or, for new participants: 4.5% of their emissions in 2013-2020 |

| | | |
|---|---|---|
| - Quality | CDM credits from Least Developed Countries (LDCs) allowed. Credits from other CDM and JI projects only eligible if registered before 2013. | CDM credits from Least Developed Countries (LDCs) allowed. Credits from other CDM and JI projects only eligible if registered before 2013.- |
| Price or supply management | | Market stability reserve that automatically adjusts the annual supply of allowances based on the surplus in the market. |
| Distribution of allowances | Free allocation to industry based on sectoral benchmarks (similar methodology as EU ETS). Full auctioning for power sector. | Free allocation to industry based on sectoral benchmarks. Full auctioning for power sector. |
| Coverage | Power sector and energy-intensive industries. $CO_2$ + other GHGs | Power sector and energy-intensive industries, intra-EU flights. $CO_2$ + $N_2O$ + PFCs |
| Compliance period | 2013-2020 | 2013-2020 |
| Point of regulation | Downstream | Downstream |
| Banking | Unlimited banking between periods. | Unlimited banking between periods. |
| Penalties | Fine of 125 CHF/$tCO_2$ (≈€104). In addition, entities must surrender missing allowances in the following year. | Fine of €100/$tCO_2$. In addition, entities must surrender missing allowances in the following year. |

## Failed attempt: linking the Australian and the EU ETS

As part of the international climate negotiations, Australia had pledged to reduce its greenhouse gas emissions by 5% compared to 2000 levels by 2020. In order to implement this target, the Australia Carbon Pricing Mechanism (CPM) came into operation in July 2012. It started with a fixed price period from 2012 to 2015, to be followed with a flexible price period planned to start in July 2015. In the 2012-2013 year, the Carbon Pricing Mechanism covered at least 285 Mt $CO_2e$ over 348 entities. During 2013-2015, the carbon price was fixed at AUD 23 (≈€15), which meant that entities could purchase carbon allowances at these fixed prices up to their emission levels. The purchased units could not be traded or banked.

In 2012, Australia and the EU announced that they will link their emission trading systems. From 1 July 2015 an interim one-way link was supposed to be established to enable Australian companies to use EU ETS allowances. The full two-way link between the two systems would take place no later than 1 July 2018. In order to facilitate the linking, the Australian government had already agreed to make two changes to the design of the Australian emissions trading system:

1. The price floor would not be implemented.

2. A new sub-limit would apply to the use of carbon offsets. Entities in Australia would still be able to meet up to 50% of their liabilities through purchasing carbon offsets, but only 12.5% of their liabilities could be met by international Kyoto units.

The proposed linkage between the EU and Australia would have been significant for two reasons. First of all, it would have been the first intercontinental linking of ETSs. Second, Australia would have had a relatively large carbon market at around 500 $MtCO_2e$ per year and would thus provide the first opportunity for the EU to link with a big market.

The change in government in Australia in 2013 however had a significant impact on these policies and put an end to the linking negotiations between the EU and Australia. The current Australian administration abolished carbon pricing and replaced it by an emissions reduction fund that will provide voluntary grants to businesses that want to reduce their emissions.

**Price floor**

The Australian government had originally planned to set a price ceiling at AUD 20 (≈€13) above the EU ETS price, increasing by 5% annually. It had also planned to enforce a minimum price for emission allowances of AUD 15 (≈€10). In light of the planned linkage with the EU ETS, Australia had agreed to refrain from introducing a price floor when the flexible price phase was scheduled to begin in 2015. Moreover, the price ceiling that was planned for the 2015-2018 period would be removed as of 1 July 2018 when the bilateral link should have taken effect.

**Carbon offsets**

Similar to the EU ETS, the Australian ETS would have also excluded carbon offsets from nuclear projects, the destruction of industrial gases and large-scale hydropower projects that are inconsistent with the EU criteria. One of the ongoing discussions between the

EU and Australia that still needed to be addressed concerned the use of Australian Carbon Credit Units (ACCUs): domestic credits generated through the Carbon Farming Initiative, which includes projects in agriculture and land-use management. No limits for the use of these ACCUs were foreseen once Australia would have moved to the flexible price system. In the EU ETS, credits generated through agricultural and land-use management activities are not accepted and therefore the role of ACCUs would have required clarification prior to the proposed link between the two schemes.

**Coverage**
The coverage between the Australian and EU regime was slightly different because under the Australian market, methane was supposed to be regulated, although it is not regulated under the EU ETS. The Australian coal mines therefore feared to be put at a disadvantage, since they would have to pay for emitting methane while those in Europe don't.

**Penalty regime**
The Australian penalty regime for non-compliance would have been amended with the transition to the flexible price system. Under the original regime, companies that failed to comply with their obligations were required to pay a penalty of 1.3 times the fixed allowance price. This penalty would have been replaced by a fine of double the average auction price for that particular year.

# Lessons from a successful linking: Quebec and California ETS

Quebec and California are the first in the world to link two existing carbon markets. In September 2013, the Californian and Quebec governments signed an agreement to link their emission trading systems effective 1 January 2014. The linking agreement merges the Quebec and California carbon market so regulated emitters can buy and sell carbon allowances and offsets in either jurisdiction. This is the first linkage under the Western Climate Initiative (WCI) which is a regional collaboration to establish a carbon trading system to reduce overall carbon emissions by 15% by 2020 among the participating jurisdictions. The WCI led to some harmonization of the cap-and-trade systems in California and Quebec but a number of differences still existed before linking.

Similar rules for price and supply management, coverage, compliance periods, banking (including holding limits) and penalties have been adopted in California and Quebec. Differences between the two systems are the allocation method for distributing free allowances to emitters and the types of offset protocols available.

The Quebec-California Linking Agreement[15] provides the overall framework for the linked carbon market. Provisions in the agreement include:

- The creation of a Consultation Committee to monitor the coordination of the cap-and-trade systems and report at least annually on this.

- Regulatory harmonization: each jurisdiction will consult each other regularly to ensure ongoing harmonization of the regulations. Quebec and California will inform each other and work together on potential changes to their respective regulatory framework.

Quebec will face the greatest impact from the linkage with the California carbon market. This is because emissions in California are nearly six times that of Quebec, so the linked price would be predominantly determined by the larger Californian market. At the same time, the opportunities to reduce emissions are more costly in Quebec than in California. This is partly due to Quebec's hydroelectric resources which means that the emissions intensity of its economy is lower than that of California and therefore measures to reduce emissions among Quebec industries are more difficult to find than amongst those in California.

The linked price will represent a marginal increase for California, but a substantial decrease for Quebec compared to unlinked carbon prices. Because of these price differentials, Quebec will purchase excess allowances from California, resulting in a net flow of revenues from Quebec to California[16].

## Key features of the Quebec/California ETS

**Relative stringency of targets**

Both in Quebec and in California the cap-and-trade system is only a support measure to increase the effectiveness of other policies by putting a price on carbon. These complimentary policies also allow the governments to retain a degree of control over their climate policies and to target emission sources that are less responsive to prices.

California is one of the largest economies in the world and its emissions are nearly six times those in Quebec. In 2012, California's emissions equaled 459 Mt CO2-eq while those in Quebec were only 78 Mt CO2-eq. Transport is the largest source of emissions in both jurisdictions. In California power generation is the second largest source of emissions, while in Quebec it is almost insignificant due to Quebec's large hydroelectric resources that dominate its energy mix. On the other hand, industry accounts for a larger share of the total emissions in Quebec than in California, partly due to the large contribution of Quebec's aluminum industry where industrial gases are generated.

Quebec has a more ambitious climate target than California. While California has set a target to stabilize its emissions to 1990 levels by 2020, Quebec committed to reducing its emissions by 20% in the same period. Also compared to 2005 levels is Quebec's 2020 emission reduction target more ambitious. California's target represents a reduction of 11% from 2005 levels, while in Quebec it represents a reduction of 22%.

**Recognition of carbon offsets**

The quantitative limit on the use of offsets is set at 8% in both California and Quebec, which means that an entity cannot meet more than 8% of its total compliance obligation in a given compliance period through the use of offsets.

Both in Quebec as in California, international offsets will play a minor role. In California a small number of international forestry credits from Brazil and Mexico are expected to be accepted for compliance in 2015[17]. Also the Quebec rules do not include international offset protocols, although the protocol for Ozone Depleting Substances

(ODS) allows for projects to take place across all of Canada or the US as long as the ODS material originates in Canada.

There are also differences between the use of offsets between California and Quebec, notably regarding the type of protocols available. There are no forest offset protocols available in Quebec, while protocols for forest carbon sinks are prominent in California. Sustainable forest management in California is expected to generate 5 Mt CO2-eq of carbon removals by 2020.

Another difference are the safeguards to guarantee the quality of the offset projects. "Buyer liability" rules were created in California, so that entities purchasing credits would be held responsible if the offset project did not create meaningful emissions savings. The California Air Resources Board (CARB) will review each offset project to verify the emissions reductions. If the project failed to deliver real emission reductions, those credited reductions must be replaced by the firm who purchased them.

This approach is in contrast with the method applied in Quebec. In Quebec the government has developed an Environmental Integrity Account, which is a state-run buffer pool of offsets to replace those invalidated. A small percentage of all offset credits are allocated to this account to create the buffer in case some of the offset credits turn out to be less credible.

**Price or supply management**

Both California and Quebec have agreed to an **auction floor price**. On 25 November 2014 Quebec and California held their first joint auction of new allowances using a common auction platform and with an auction floor price of USD 11.34 or CAD 12.82[18]. In advance of each joint auction an Auction Exchange Rate is set, according to the most recently available noon daily buying rate for US and Canadian dollars. The auction reserve price will rise at 5% per year plus an inflation adjustment.

Secondly, also a **soft price ceiling** has been adopted under the WCI. The price ceiling is implemented by an Allowance Price Containment Reserve, administered independently by each jurisdiction, and used to collect a share of allowances from auction each year for release if a certain predetermined price is reached. This accounts holds 1% of allowances under the cap for 2013-2014, 4% for 2015-2017 and 7% of allowances under the cap set for 2018-2020. If the allowance price rises to the pre-determined level, the reserve allowances are made available via a "sale by mutual agreement" that is coordinated by WCI. Alternatively, the jurisdiction may choose to use these reserve allowances to increase the amount of free allowances to emitters. In Quebec, in case of a sale by mutual agreement, the allowances in the reserve account are divided equally into three categories to be sold at the following prices:

- Category A: CAD $40 per emission allowance;
- Category B: CAD $45 per emission allowance;
- Category C: CAD $50 per emission allowance;

These prices will rise annually by 5% plus inflation beginning in 2014. The rules and prices for California's system are similar.

**Distribution of allowances**

Both in Quebec as in California, most allowances will be freely allocated during the first compliance period 2013-2014. Over the period 2015-2020, the share of freely allocated allowances will gradually decrease as more allowances will be auctioned. In California, the amount of free allowances to industrial installations is based on the total production levels, the emissions benchmark, the 'cap adjustment factor' to reflect a tightening emissions cap and an 'industry assistance factor'. The 'industry assistance factor' is based on the industry's leakage risk: low leakage sectors are only allocated 50% free allowances during 2015-2020 for example.

In Quebec the allocation of free allowances during 2015-2020 will be based on an emission intensity target differentiated per industrial sector. That means that different industrial activities will face different levels of stringency. Overall, the number of freely allocated allowances will decrease by between 1% and 2% per year, starting in 2015. Furthermore, Quebec's environment ministry retains 25% of allowances until the following year for which they are to be used, in order to verify the emitter's emissions. The allocation amount is then adjusted accordingly. This safeguard is introduced in order to avoid significant oversupply.

**Coverage and point of regulation**

During the first commitment period (2013-2014), the carbon market will only address emissions in the energy and industrial sectors, which account for around 36% and 29% of total emissions in California and Québec, respectively. During this time, the cap decreases by about 2% annually in both jurisdictions. At the beginning of the second compliance period, in 2015, coverage expands to include fuel distributors (including distributors of heating and transportation fuels), at which point around 87% and 77% of emissions will be covered in both jurisdictions. Between 2015 and 2020, the cap reduces at a rate of around 3% per year.

**Banking and borrowing**

In the Quebec and California carbon market, unlimited banking is permitted, although participants are subject to **holding limits**[19]. Holding limits are a limit on the amount of allowances that are not destined for use in the current compliance year and which a participant can hold to bank for future use. They represent the maximum number of allowances that may be held by an entity at any point in time and separately calculated for holdings of allowances with a vintage year corresponding to the current or previous calendar years and for allowances with a vintage year greater than the current calendar year. Offsets are not included in the holding limit.

The annual holding limit for a participant in the California and Quebec systems is around 6 million allowances for vintage year 2014 and around 13 million for 2015.

# Comparison of the Quebec-California ETS and the EU ETS

There are quite significant differences between the linked Quebec-California carbon market and the EU ETS. The differences that make linking the Quebec-California ETS with the EU ETS especially challenging are:

- **The relative stringency of the targets.** While Quebec has the same 2020 climate target as the EU, California's 2020 target (whose emissions are nearly six times those in Quebec) is a stabilization of their 1990 emissions, which is significantly less ambitious than the EU's 2020 target.

- **The quality of offsets allowed**. The Quebec and Californian carbon market mostly focus on domestic carbon offsets, but allow for different offset protocols than those allowed in the EU. For example, offsets from forest carbon sinks feature prominently in California, which means that permanent emissions can be offset by temporary carbon storage. Forest offsets are not allowed for use under the EU ETS, precisely because the permanence of forest projects cannot be guaranteed.

- **Price and supply management.** The California and Quebec ETS have implemented a price corridor consisting of an auction floor price and a soft price ceiling. This goes against the direction taken in the EU, since the European Commission has ruled out measures that directly manage prices like price floors. The EU will instead establish a market stability reserve that automatically adjusts the supply of allowances based on pre-defined rules.

At the same time, there are elements in the Quebec-California ETS that could improve the effectiveness of the EU ETS. "Buyer liability" rules were for example created in California as a safeguard for offset quality. Entities that have purchased offsets credits will be held responsible if the offset project did not create meaningful emissions savings. In that case, the offset purchaser has to replace the invalidated offsets within six months. The EU ETS has been mired by the large inflow of low-quality offsets, which have undermined its ability to reduce global greenhouse gas emissions.

The Quebec and California carbon markets have also introduced holding limits that provide a limit on the amount of allowances that participants can hold to bank for future use. These holding limits aim to provide a defense against companies using a large share of allowances to either exercise market power or manipulate the allowance market.

The table below compares the key design features between the Quebec/California ETS with the EU ETS

| | Quebec and California ETS | EU ETS |
|---|---|---|
| Stringency of target | 3.1% and 3.2% of 2015 average annual reduction in California resp. Quebec | 1.74% of 2008-2012 average annual reduction |
| Overall cap | Absolute cap of 394.5 Mt $CO_2e$ (2015) down to 334.2 (2020) in California; 65.3Mt $CO_2e$ (2015) down to 54.75 (2020) in Quebec | Absolute cap of 2,084 Mt $CO_2e$ in 2013 |
| Carbon offsets: | | |
| - Quantity | 8% of its total compliance obligation (e.g. total amount of allowances) in a given compliance period | During 2008-2020, participants may use carbon offsets up to a maximum of 11% of its 2008-2012 allocation, or, for new participants: 4.5% of their emissions in 2013-2020 |
| - Quality | Mostly limited to domestic offsets. Different protocols available including forest protocols in California. "Buyer liability" rules introduced in California | CDM credits from Least Developed Countries (LDCs) allowed. Credits from other CDM and JI projects only eligible if registered before 2013 |
| Price or supply management | Auction floor price of $11.34/tonne in 2014, rising 5% annually + inflation. Soft price ceiling through a strategic reserve. | Market stability reserve that automatically adjusts the annual supply of allowances based on the surplus in the market. |
| Distribution of allowances | Free allocation for industry and power, whereby the amount of free allocation declines over time. California and Quebec apply different allocation methods. | Free allocation to industry based on sectoral benchmarks. Full auctioning for power sector |
| Coverage | Power sector, energy-intensive industries, distributors of heating and transport fuels. $CO_2$ + $N_2O$ + PFCs | Power sector and energy-intensive industries, intra-EU flights. $CO_2$ + $N_2O$ + PFCs |
| Compliance period | Downstream + upstream (fuel distributors) | Downstream |
| Banking | Unlimited banking, although participants are subject to holding limits | Unlimited banking between periods |
| Penalties | Entities must surrender 4 allowances or offsets for every one missed. Penalties may also be applied | Fine of €100/$tCO_2$. In addition, entities must surrender missing allowances in the following year |

# Prospects for linking the future Chinese and EU ETS

In 2013 and 2014, seven pilot carbon markets were launched in 5 Chinese cities (Beijing, Tianjin, Chongqing, Shanghai and Shenzhen) and two provinces (Hubei and Guangdong). In aggregate, the seven pilot emissions trading systems make up the second largest carbon market in the world, covering more than 700 million tonnes of CO2. The experiences gained with these pilots are expected to be useful for rolling-out the nation-wide emissions trading system from 2016 to 2020.

When China starts the national carbon market around 2020, it is expected to cover three to four billion tonnes of CO2, overtaking Europe as the biggest carbon market in the world. The Chinese ETS will be roughly twice the size of the EU ETS.

At the end of 2014, the overall rules for the national ETS were released by China's top economic planning agency, the National Development and Reform Commission (NDRC). The NDRC will draw up CO2 emission caps for China as a whole, as well as for each province. It will also decide which sectors of the economy will be given emission caps. While initially most carbon allowances will be allocated to companies for free, an increasing amount will be auctioned over time. Although the exact design of the nation-wide Chinese ETS is yet unknown, it is expected that the design and implementation of the national programme will build on the lessons learned from the seven pilot carbon markets that are described below.

## Key features of the Chinese ETS (pilots)

**Relative stringency of targets**
At the 2009 Copenhagen summit, China pledged to reduce the carbon emissions intensity of its economy by 40-45% against 2005 levels by 2020. The absolute level of emissions by 2020 is uncertain as it depends on the future growth of China's economy. With currently implemented policies, China will meet its 2020 pledge and reach an emissions level of 13.2 GtCO2e in 2020[20]. This is substantially above current emission levels. In contrast, the EU has a 2020 target of reducing its absolute greenhouse gas emissions by 20% compared to 1990 levels.

China has recently announced that it will launch a national carbon market by 2020, but the details in terms of its ambition are yet unclear. It is highly unlikely that absolute emissions in the Chinese ETS will need to decline after 2020. In the EU ETS, emissions will decline by at least 2.2% of the 2008-2012 average annually post-2020.

**Recognition of carbon offsets**
The Chinese pilot systems only accept one type of offset unit: China Certified Emission Reduction (CCER). In the pilots, the quantitative limits on these domestic **offsets** range between 5% to 10% of the company's annual allocation. In addition, some regions established origination requirements. There is no restriction on offset project types in the pilots, although Guangdong encourages the development of forestry carbon sequestration projects. It is likely that the quantitative and qualitative rules for the use of offsets in the future national carbon market will continue to be set at the provincial level.

In contrast, the restrictions on the quantity and quality of offset credits in the EU ETS are set top-down at the EU-level and forestry offset projects are not allowed. After 2020, the use of international offsets will be excluded from the EU ETS.

**Price or supply management**
In all of the seven pilot systems, the regional authority or the exchange can take price stabilization measures. In certain cities, the municipal government authorities can buy back or auction allowances if there are market fluctuations for example. In Guangdong a floor price for auctions has been introduced that rises over time.

In contrast, in the EU a market stability reserve will be established that automatically adjusts the supply of allowances based on pre-defined rules, with no discretion to the authorities. The European Commission has ruled out measures that directly manage prices like price floors.

**Distribution of allowances**
Most of the Chinese pilot systems allocate allowances for free to the companies. While benchmarking for new entrants or certain industrial processes have been introduced, the most common method of allocating allowances is grandfathering based on historic emissions or emission intensities. In Guangdong, an increasing share of allowances will be auctioned (3% in 2013 rising to 10% in 2015). In Shenzhen and Shanghai the concept of "provisional" allocation has been introduced, which means that ex-post allocation adjustments are possible (on the basis of actual production data for example). Another unique feature of the Shanghai pilot is that the allowances are allocated for 2013-2015 one-off at the beginning of the pilot period.

In the EU ETS, around half of the allowances are auctioned, while only the rest is freely allocated. The method for allocation free allowances to companies during phase III (2013-2020) is EU-harmonized sectoral benchmarking using historic production data.

**Coverage and point of regulation**
The pilot regions were carefully chosen to represent the spectrum of economic development and wealth in China and they therefore differ in their scope. Industrial sectors and the power sector are covered by practically all pilot systems. The building sector accounts for a large proportion of the emissions in the cities of Beijing, Shanghai and Shenzhen, which is why large commercial and public buildings are also covered by the pilot systems in these cities. In Shanghai the transportation sector (railway stations, airlines, airports, harbor) is covered by the ETS pilot as well.

Furthermore, in contrast to the EU ETS, not only direct but also indirect emissions caused by the consumption of outsourced power or heat are covered by the pilot systems. This is the result of China's almost completely regulated energy sector including regulated power prices. Energy firms in China are therefore prevented from passing on their carbon costs to their consumers. These consumers hence do not receive any financial signal to reduce emissions, unless the indirect emissions of their power consumption are also covered by the pilot carbon markets. Double counting of these emissions should not be a concern as long as there is proper accounting.

# Comparison of the future Chinese ETS and the EU ETS

The Chinese national carbon market will be launched in 2016, but it appears that only some provinces or sectors will be included from the outset. The idea is to gradually expand the Chinese carbon market so that by 2020 it covers all of China. A linkage between the Chinese and the EU ETS will hence not happen anytime soon, at least not before China sets an absolute cap on the emissions from its ETS sectors.

Even if China decided to limit the amount of carbon emissions to an absolute level, its ambition level would be lower than the EU's ambition level. In this case it would be cheaper for European companies to purchase emission reductions from Chinese firms than to invest in efficiency measures for their own production processes. The transfer of wealth from Europe to China could be perceived as problematic for some European policymakers, while for other politicians the lack of ambition in the Chinese system could act as a barrier for linking.

Other design difficulties that make it extremely challenging to link the Chinese and the EU ETS are related to the recognition of carbon offsets and the price control measures. Offsets from forest sinks cannot be used for compliance in the EU ETS, because the permanence of forest projects cannot be guaranteed. They are however allowed in the Chinese pilots. Finally, all the Chinese pilots include price stabilization measures that have been ruled out in the EU context.

At this moment, the seven Chinese pilot systems are still in their infancy and have the principal aim to improve the carbon trading governance. Positive experiences so far include the increased capacity to track carbon emissions at the enterprise level. While the ETS developments in China have been extremely rapid, there are several barriers which needs to be addressed when China implements its national carbon market:

**The completely regulated energy market.**
The Chinese state still retains a tight grip on oil product prices, gas prices and electricity tariffs. This market rigidity prevents Chinese energy companies from passing along their carbon costs to their consumers. The absence of this flexibility risks the long-term viability of either the carbon market or these entities as they become squeezed between the market prices for carbon and the administratively set prices of their power sales. One can hence question the ability of Chinese energy companies to participate in actual carbon trading. Meanwhile, grid operators have the capability to decide which power plant will supply how much power to which energy company. Without energy market liberalization, the Chinese environment seems unfit for carbon markets to function in a fully efficient manner. Most of the industry is furthermore state-owned with close ties to the Chinese government.

**The lack of transparency in the pilot systems.**
There is currently no public data on the total emissions, the emissions at the enterprise level and the allocation of allowances. This jeopardizes the credibility of the carbon market, because public scrutiny of companies is made impossible while the entities themselves have severe difficulties implementing compliance strategies. It has been suggested that more data could be released in the future, as China is still in the early stages of its ETS developments.

**The lack of stakeholder involvement.**
China still lacks the tradition of stakeholder consultations. This has been a serious concern for many stakeholders especially at the time when the pilots were established. Fortunately, most of the pilot regions have sought some means of seeking comments or advice from stakeholders (especially from entities covered by the system).

**The lack of liquidity.**
At the start of the Chinese pilots, it was only possible for trading to happen through the exchanges, which means that over-the-counter trading was not allowed. But recently there have been some positive signs with Shenzhen's being the first to allow non-covered entities to trade on its exchange, while Beijing was the first to stipulate that deals between related parties and above certain sizes can be conducted in the over-the-counter market also. The ban on futures trading in carbon permits is another reason for the lack of liquidity in the market, although there are indications that the government will remove this ban in the near future. Currently most of the trading happens just before the compliance date, with some stakeholders questioning how much of this trading is based on market fundamentals, and how much of it are forced trades.

The table below compares the key design features between the Chinese ETS pilots and the EU ETS

| | Chinese pilot ETS | EU ETS |
|---|---|---|
| Stringency of target | China's overall goal for 2020 is to reduce the $CO_2$ per unit of GDP by 40-45% relative to 2005 | 1.74% of 2008-2012 average annual reduction |
| Overall cap | Beijing: 50 Mt<br>Chongqing: 125 Mt (2013)<br>Guangdong: 388 Mt (2013), 408 Mt (2014)<br>Hubei: 324 Mt (2014)<br>Shanghai: 160 Mt<br>Shenzhen: 32 Mt<br>Tianjin: 160 Mt | Absolute cap of 2,084 Mt $CO_2e$ in 2013 |
| Carbon offsets: | | |

| | | |
|---|---|---|
| - Quantity | Beijing: CCERs allowed up to 5% of annual allocation (50% from Beijing, incl. forest carbon sinks).<br>Chongqing: CCERs allowed if emissions>allocation (up to 8% of compliance obligation).<br>Guangdong: CCERS allowed up to 10% of annual compliance obligation (of which >70% from Guangdong).<br>Hubei: CCERs from Hubei allowed up to 10% of annual allocation.<br>Shanghai: CCERs allowed up to 5% of annual allocation.<br>Shenzhen: CCERs allowed up to 10% of annual compliance obligation.<br>Tianjin: CCERs allowed up to 10% of annual compliance obligation. | During 2008-2020, participants may use carbon offsets up to a maximum of 11% of its 2008-2012 allocation, or, for new participants: 4.5% of their emissions in 2013-2020 |
| - Quality | | CDM credits from Least Developed Countries (LDCs) allowed. Credits from other CDM and JI projects only eligible if registered before 2013. |
| Price or supply management | Beijing: Beijing DRC can buy or auction allowances to stabilize the market.<br>Chongqing: exchange can take price stabilization measures. Entities must not sell more than 50% of their free allocation.<br>Guangdong: floor price for auctions. The floor price will increase from CNY 25 to CNY 40 in steps of CNY 5 with each quarterly auction.<br>Hubei: exchange can take price stabilization measures.<br>Shanghai: if prices vary more than 30% in one day, the exchange can take prize stabilization measures, temporarily suspend trading or impose holding limits.<br>Shenzhen: Shenzhen DRC can sell allowances from a reserve at a fixed price, or buy back up to 10% of total allocation.<br>Tianjin: Tianjin DRC can buy or sell allowances to stabilize the market. | Market stability reserve that automatically adjusts the annual supply of allowances based on the surplus in the market. |
| Distribution of allowances | Beijing: mainly free allocation through grandfather based on 2009-2012 emissions or emissions intensity.<br>Chongqing: free allocation through grandfathering based on historic emissions. If sum of allocations exceeds the cap, a reduction factor is applied.<br>Guangdong: mainly free allocation through grandfathering based on 2009-2012 emissions and benchmarking. 3% (2013) to 10% (2015) of allowances are auctioned.<br>Hubei: mainly free allocation through grandfathering (historic emissions). Auctioning of small amount of allowances.<br>Shanghai: one-off free allocation for whole period based on 2009-2011 emissions. Ex-post adjustments are possible. In 2013, a one-off auction took place.<br>Shenzhen: free allocation based on sectoral benchmarks. Ex-post adjustments possible. In 2014 3% of allowances are auctioned.<br>Tianjin: mainly free allocation through grandfathering (based on 2009-2012 emissions or emissions intensity). | Free allocation to industry based on sectoral benchmarks. Full auctioning for power sector. |
| Coverage | Pilots cover power and industry sectors. Some pilots include service sector, aviation, railways, commercial, financial sector, buildings. Only $CO_2$ (except Chongqing). | Power sector and energy-intensive industries, intra-EU flights. $CO_2$ + $N_2O$ + PFCs |
| Compliance period | Pilots run from 2013-2015 | 2013-2020 |
| Point of regulation | Mixed: both upstream and downstream as direct and indirect emissions are covered. | Downstream |
| Banking | Banking allowed during the period/pilot phase. | Unlimited banking between periods. |
| Penalties | Beijing: fine 3-5 times the average carbon price for each missing allowance.<br>Chongqing: fine from CNY 20,00-50,000.<br>Guangdong: fine CNY 50,000 (€) and twice the missing allowances will be deducted from next year's allocation.<br>Hubei: fine 1-3 times the average carbon price and twice the missing allowances will be deducted from next year's allocation.<br>Shanghai: fine CNY 10,000-50,000 + further sanctions may be imposed<br>Shenzhen: fine 3 times the carbon price and the missing allowances will be deducted from next year's allocation or withdrawn from the company's account.<br>Tianjin: companies are disqualified for preferential financial support for 3 years | |

# Prospects for linking the South Korean and EU ETS

South Korea does not have a binding commitment under the Kyoto Protocol, but it has pledged to reduce its emissions by 30% relative to the country's projected levels by 2020 as part of the Copenhagen Accord. The Framework Act on Low Carbon Green Growth, enacted in 2010, forms the foundation of South Korea's transition towards its low-carbon development, setting out an emissions reductions target and providing for the introduction of an ETS. The ETS was drafted in the following years and in November 2012 the final step towards the introduction of the carbon market was taken with the enactment of the presidential decree. Emissions trading in South Korea has begun in 2015.

## Key features of the South Korean ETS

**Relative stringency of targets**

South Korea has pledged to reduce its emissions by 30% relative to business as usual by 2020, which is around **4% below 2005 levels.** In contrast, the EU's target is to reduce emissions by 20% relative to 1990 levels by 2020, which is **21% below 2005 levels** for the EU ETS. At the same time, the expectation is that the carbon price in the South Korean ETS will be higher than the EU ETS price due to limited cost-effective mitigation measures in the power and industry sectors. Others have indicated that this will result in the South Korean government loosening its 2020 emissions goal. At the first day of trade, the South Korean carbon allowances were sold near the EU ETS price level.

The caps for the second and third trading phase of Korea's ETS are yet to be announced. For the first trading period, the annual ETS cap will gradually decrease from 573 MtCO2e in 2015, to 562 MTCO2e in 2016 and 551 MtCO2 in 2017.

**Recognition of carbon offsets**

In South Korea, during phase 1 (2015-2017) and phase II (2018-2020) only domestic credits from activities implemented by non-ETS entities may be used for compliance in the South Korean ETS. Eligible activities include those eligible under the CDM and carbon capture and storage (CCS), as long as the activities were implemented after 14 April 2010. The limit for the use of carbon offsets is set at 10% of a company's compliance obligation. In phase III (2021-2025), up to 50% of the total offsets allowed into the scheme may be covered by international offsets.

This contrasts with the EU ETS where participants can use international offsets from most project categories from the Kyoto's Protocol's Clean Development Mechanism (CDM) and Joint Implementation (JI) mechanism. This excludes CCS projects. New-project offsets are prohibited from 2013, unless they are from Least Developed Countries. The limit for the use of carbon offsets is set at 11% of a company's 2008-2012 allocation. For the period after 2020, the EU has set itself a target to reduce domestic emissions by at least 40% by 2030, which excludes the use of international offsets.

**Price or supply management**

South Korean's government has the ability to increase the supply of allowances if carbon prices rise too high. Specifically, the government has been given the power to hold early auctions for up to 25% of reserve permits in order to contain prices.

In addition, the government has been allowed to intervene with market-stabilizing measures in case of significant changes in prices or trading volumes. If there is a need to stabilize the market, the government may: (1) set minimum or maximum limits for the holding of allowances by each participant, (2) limit or increase the amount of banking and borrowing, (3) increase or reduce the offset limit, and (4) set price ceilings and floors, subject to Allowance Committee review.

These measures are authorized if one of the following scenarios applies:

- There is a price hike: a greater than threefold increase for six straight months from the average carbon price.
- There is a demand hike: the average carbon price increases more than two-fold due to a more than two-fold increase in trade volume.
- There is a price crash: the price in a one month period decreases by more than 60% of the average.

In contrast to South Korea where the authorities have the right to increase the supply of allowances in certain circumstances, the EU is in the process of establishing a market stability reserve that will automatically adjust the supply of allowances based on pre-defined rules, with no discretion to the authorities.

**Distribution of allowances**

The South Korean ETS consists of three trading period. The first two phases (2015-2017 and 2018-2020) are trial phases. The third phase will cover a longer period of 2021-2025. In the first phase, 100% of allowances are allocated free of charge and there will hence be no auctioning. This will be reduced to a maximum of 97% in phase II, falling to a maximum of 90% in phase III. To compare: during phase III (2013-2020) of the EU ETS around 50% of allowances will be auctioned.

The criteria to determine which energy-intensive sectors are considered to be at risk of carbon leakage are identical in the EU and South Korea. In South Korea these companies will receive all of their allowances free of charge according to the grandfather approach, e.g. based on the average emissions during the base period (2011-2013). Only for three sectors (grey clinker, oil refinery and aviation) will the allocation of free allowances be based on benchmarks on previous activity data during the base period. In the EU ETS, all free allowances are in principle allocated on the basis of benchmarks for each relevant product.

In South Korea, around 5% of total allowances in phase I are retained in the reserve for market stabilization measures, early action[21] and new entrants. In addition, any unallocated allowances and withdrawn allowances will be transferred to the reserve.

**Coverage and point of regulation**

The South Korean carbon market applies to individual installations emitting over 25,000 tCO2e annually or entities whose combined installations emit over 125,000 tCO2e. The South Korean ETS will cover approximately 470 companies and 1,600 installations from sub-sectors such as steel, cement, petro-chemicals, refineries, power, buildings, waste and aviation, covering around two-thirds of Korea's total greenhouse gas emissions. The EU ETS applies to large installations from power plants and many energy-intensive manufacturing sectors, as well as aviation.

The South Korean ETS will include all six Kyoto Protocol greenhouse gases. In addition to CO2, N2O and PFCs, which are covered by the EU ETS, it will also cover methane ($CH_4$), hydro fluorocarbon (HFC), and sulfur hexafluoride ($SF_6$). The South Korean scheme applies to both direct and indirect emissions, while the EU ETS only regulates direct emissions.

**Banking and borrowing**

In both the EU and South Korean carbon market, banking of allowances is completely unrestricted. In the South Korean ETS, borrowing of allowances is only be permitted within a single trading period up to a maximum of 10% of the company's obligation. In the EU ETS, borrowing is also only allowed within a certain trading period. Borrowing is implicitly possible in the EU ETS because allowances for the new trading year are allocated two months before installations have to surrender allowances for the previous year.

**Penalties and enforcement**

Both in the EU and South Korean carbon market, companies that fail to surrender sufficient allowances will face a penalty. In South Korea, the fine shall not exceed three times the carbon price of the given compliance year, with a maximum of KRW 100,000 (≈€75) per tonne of CO2e. In the EU the fine is €100 per tonne and in addition, the non-compliant company has to surrender the missing allowances in the next trading year. The absence of such a provision in South Korea effectively means that the maximum fine will act as a price ceiling for allowances in the linked carbon market.

**Comparison of the South Korea ETS and the EU ETS**

Both South Korea and the EU stand to gain from linking their carbon markets, because of the expected high carbon price in South Korea. Linking with the EU ETS could reduce the carbon cost for South Korean firms, while at the same time boost the low carbon price in the EU. It would be the first intercontinental linkage, sending a signaling effect about the EU's commitment to advancing climate change actions through carbon pricing. But there are also risks, since the size of the South Korean carbon market implies that the EU ETS is more exposed to developments in South Korea than was the case when linking to smaller schemes. Because of its larger carbon market, South Korea might also be less willing to make concessions and aligning key features with the EU ETS.

Carbon trading has only started in 2015, which means that the South Korea ETS is still in its infancy compared to the EU ETS. The EU ETS initially started with a trial phase during 2005-2007 and afterwards several improvements to the system were still implemented. Even during the third phase of the EU ETS (2013-2020), new structural measures to address the demand-supply imbalance have been proposed. Linking discussions between the EU and South Korea are hence unlikely to start before 2025, so as to also allow the South Korean ETS to mature.

There are some similarities between the EU ETS and the South Korea ETS, but there are also significant differences, some of which could potentially pose barriers to linkage. The similarities between the South Korea and the EU ETS are related to the similar MRV (monitoring, reporting and verification) and banking rules. The differences between the two schemes relate for example to the distribution of allowances and the coverage. These differences are not expected to pose a barrier to linking. Other differences, including the recognition of carbon offsets and price and supply controls, could pose barriers to linking the EU ETS with the South Korean carbon market.

The South Korean carbon market allows the use of domestic offsets that are not eligible in the EU ETS, like carbon capture and storage (CCS) projects. After 2020 also international offsets will be allowed. In contrast, under the EU ETS the use of international offsets will not allowed in the post-2020 period. Linking the EU ETS with another carbon market means that the offsets allowed in the other system also become available in the EU ETS. Linking the European carbon market to any other market that allows the use of offsets after 2020 will hence be problematic for the EU.

In South Korea, the government has the ability to increase the supply of allowances in certain circumstances. It will be extremely difficult for the EU to give authorities the discretion to intervene in the carbon market without democratic oversight. Instead, it has been proposed to automatically adjust the supply of allowances based on pre-determined criteria. The price and supply control measures in the EU and South Korean ETS are currently incompatible and require significant harmonization before linking can take place.

The table below compares the key design features between the South Korea ETS with the EU ETS

| | South Korea ETS | EU ETS |
|---|---|---|
| Stringency of target | 11 Mt CO2e reduction from 2015-2017 (±1.9% annual reduction of 2015 level) | 1.74% of 2008-2012 average annual reduction |
| Overall cap | Absolute cap of 573 Mt CO2e in 2015 (declining to 551 Mt CO2e in 2017) | Absolute cap of 2,084 Mt CO2e in 2013 |
| Carbon offsets: | | |
| Quantity | During phase I and II (2015-2017, 2018-2020), participants may use domestic carbon offsets up to a maximum of 10% of each entity's compliance obligation. In phase III (2021-2025), entities may cover up to 50% of the total offsets allowed with international offsets. | During 2008-2020, participants may use carbon offsets up to a maximum of 11% of its 2008-2012 allocation, or, for new participants: 4.5% of their emissions in 2013-2020 |

| | | |
|---|---|---|
| Quality | Only domestic credits implemented by non-ETS entities may be used during phase I and II. Eligible activities include CCS. Only activities implemented after 14 April 2010 are eligible. | CDM credits from Least Developed Countries (LDCs) allowed. Credits from other CDM and JI projects only eligible if registered before 2013. |
| Price or supply management | Early auctions possible for up to 25% of reserve permits. The government may directly intervene in the market if there is a need to stabilize prices. | Market stability reserve that automatically adjusts the annual supply of allowances based on the surplus in the market. |
| Distribution of allowances | In phase I, 100% free allocation, mostly based on grandfathering. In phase II, 97% free allowances. In phase III, less than 90% freely allocated. Carbon leakage sectors receive 100% free allowances (similar criteria as EU ETS). | Free allocation to industry based on sectoral benchmarks. Full auctioning for power sector. |
| Coverage | Power sector, energy-intensive industries, buildings, waste sector, domestic aviation. $CO_2$ + 5 other GHGs | Power sector and energy-intensive industries, intra-EU flights. $CO_2$ + $N_2O$ + PFCs |
| Compliance period | 2015-2017, 2018-2020, 2021-2025 | 2013-2020 |
| Point of regulation | Downstream, direct + indirect emissions. | Downstream |
| Banking | Unlimited banking between periods. Borrowing allowed only within a single trading phase (max. 10% of entity's obligation). | Unlimited banking between periods. |
| Penalties | Fine shall not exceed three times the average carbon market price or KRW 100,000/ton (≈€75). | Fine of €100/t$CO_2$. In addition, entities must surrender missing allowances in the following year. |

## Prospects for linking the New Zealand and EU ETS

The New Zealand emissions trading system was introduced by legislation in 2008 in order to support its international climate obligations and reduce New Zealand's net emissions below business-as-usual levels. It is a nationwide carbon market, without a cap, that has gradually phased in covered sectors from 2008 onwards. Around half of the country's total greenhouse gas emissions (excluding emissions from land use, land-use change and forestry, LULUCF) can be attributed to the agriculture sector. Biological emissions from agriculture are however not covered by the New Zealand ETS (yet).

**Comparison of the New Zealand ETS and the EU ETS**

It is currently impossible to link the New Zealand ETS with the EU ETS. The inclusion of the land sector in New Zealand's carbon market makes it politically very challenging to link it with the EU ETS. New Zealand also needs to make a number of significant amendments to its carbon market such as setting a total cap on emissions and introducing a limit on the use of international offsets before linking with other market can be considered.

The fact that the New Zealand ETS does not impose a cap on the total number of allowances is one of the main difficulties for future linking. In theory the New Zealand government has the power to auction allowances and set a cap on the total supply of allowances. However, to date no auctioning has taken place. Free allocation is intensity-based, which means that the allocation of free allowances is based on the emissions and output of the previous year. The total amount of emission permits is determined in a bottom-up fashion and therefore the environmental outcome cannot be guaranteed. This stands in stark contrast to the EU ETS which imposes annual absolute caps that decline over time.

Other features of the New Zealand ETS that will make linking virtually impossible include the "two for one" surrender obligation (entities in all sectors except forestry are required to surrender only one unit for every two tonnes of emission) and the unlimited access to international offsets. This latter provision has led to the extreme reliance on the cheapest, and in some cases lowest quality, international offsets, drawing even more questions on the environmental effectiveness of the system. The New Zealand government has recently decided not to take on a second commitment under the Kyoto Protocol, which means that the country loses access to the Kyoto flexible mechanisms. As a result, from 1 June 2015 international offsets will no longer be eligible for use in the New Zealand ETS.

The unique design feature of the New Zealand ETS is the inclusion of forestry. It is the first carbon market in the world to include forestry both as a source of allowances from carbon removals and as direct point of obligation for emissions due to deforestation. Landowners of pre-1990 forests are obliged to surrender allowances for the emissions resulting from deforestation of their land. Owners of post-1990 forest land may voluntarily join the ETS and earn allowances as their forests grow. Recently it was decided that pre-1990 forest land owners are allowed to offset emissions associated with deforestation of their land by establishing new forest elsewhere.

The effectiveness of the New Zealand ETS to increase afforestation and avoid deforestation has been questioned. According to Richter & Chambers (2014), "the price of carbon in New Zealand is currently not sufficient to deter deforestation or incentivize new planting". They refer to a deforestation survey of 2012, which shows that 'the ETS scenario leads to higher levels of deforestation than the no

ETS scenario' and predicts higher deforestation rates in the 2020s and continuing conversion of forest land to dairy.

The table below compares the key design features between the New Zealand ETS with the EU ETS

| | New Zealand ETS | EU ETS |
|---|---|---|
| Stringency of target | No target for ETS. Overall target: -5% by 2020 below 1990 GHG levels. | 1.74% of 2008-2012 average annual reduction |
| Overall cap | No cap on the number of allowances. | Absolute cap of 2,084 Mt CO2e in 2013 |
| Carbon offsets: | | |
| - Quantity | Unlimited international offsets allowed from 1st commitment period of the Kyoto Protocol until May 2015. | During 2008-2020, participants may use carbon offsets up to a maximum of 11% of its 2008-2012 allocation, or, for new participants: 4.5% of their emissions in 2013-2020 |
| - Quality | No offsets from: nuclear projects, HFD-23 and N2O destruction projects, large hydro projects. Pre-1990 forest owners can offset deforestation by afforestation elsewhere. | CDM credits from Least Developed Countries (LDCs) allowed. Credits from other CDM and JI projects only eligible if registered before 2013. |
| Price or supply management | NZD 25 (≈€16.6) fixed price option. | Market stability reserve that automatically adjusts the annual supply of allowances based on the surplus in the market. |
| Distribution of allowances | 60-90% free allocation for industrial sectors (intensity based). Pre-1990 forestry and fishery received one-off free allocation. Energy, industrial, waste sectors are required to surrender only 1 allowance for every 2 tonnes of emissions. | Free allocation to industry based on sectoral benchmarks. Full auctioning for power sector. |
| Coverage | Forestry, liquid fossil fuels, stationary energy and industrial processes, waste and synthetic GHG. Six gases (CO2, CH4, N2O, PFCs, SF6). | Power sector and energy-intensive industries, intra-EU flights. CO2 + N2O + PFCs |
| Compliance period | 1 year (January – December) | 2013-2020 |
| Point of regulation | Upstream | Downstream |
| Banking | Banking allowed | Unlimited banking between periods. |
| Penalties | Fine of NZD 30-60/tCO2 (≈€20-40) in addition to being forced to surrender missing units. | Fine of €100/tCO2. In addition, entities must surrender missing allowances in the following year. |

# Prospects for linking the Kazakhstan and EU ETS

Kazakhstan is one of the most energy-intensive countries in the world, which is largely due to its power production process. Kazakhstan's emissions saw a steep decline after 1990, hitting the floor in 1999 at 146 Mt CO2, or 60% below 1990 levels. After this, emissions have increased steeply, mainly due to the energy and industry sectors.

As part of the second commitment period of the Kyoto protocol, Kazakhstan intends to reduce its average annual emissions during the 2013-2020 period by 10% below 1990 levels. This target is conditional on full carry-over of surplus from the first commitment period.

In order to achieve its climate targets, the Kazakh emissions trading system was enacted in 2011. Kazakhstan was the first Asian country to launch a nationwide ETS, which came into effect on 1 January 2013, capping the emissions of its biggest emitters in the energy, coal and gas, extraction sectors.

**Comparison of the Kazakhstan ETS and the EU ETS**

Kazakhstan has an extremely carbon-intensive economy, with one of the world's highest emissions per economic output. Its emissions have experienced a rapid drop after 1990 before rising by more than 60% over the last ten years. The emissions reduction target of Kazakhstan is therefore considerably lower than the EU's 2020 objective, especially compared to 2005 levels.

The level of experience with carbon trading is also very recent. Kazakhstan launched a pilot phase of the ETS in 2013 covering

178 companies or about 55% of the country's greenhouse gas emissions. These entities were required to stabilize their 2013 $CO_2$ emissions at 2010 levels, but they did not occur any penalties in case of non-compliance. They furthermore received free allocation of emissions allowances based on their 2010 emissions and were allowed to use an unlimited amount of domestic offsets for compliance purposes.

This first pilot phase provided experience with carbon markets to further develop the system. The Kazakh's authorities were for example able to collect third-party verified data for 2012 emissions of covered entities. There are however still some significant challenges that need to be addressed in the coming years. So far there has been no clear price signal: the first allowance transaction that took place in March 2014 had an average price of 455 KZT ≈ €2. This is low, even compared to the carbon price in the EU ETS. During the first pilot phase no trade of allowances took place at all.

Other challenges include improving the methodology for allowance allocation (currently grandfathering), improving the work performed by the independent accredited entities (verifiers) and increasing market liquidity.

It is hence clear that it is too early to start linking discussions between the Kazakh and EU ETS. There are barriers due to ETS design differences, but the economic structure and the lack of experience with carbon trading in Kazakhstan make linking with the EU ETS something to be considered in the very long-term only.

The table below compares the key design features between the Kazakhstan ETS with the EU ETS

| | Kazakhstan ETS | EU ETS |
|---|---|---|
| Stringency of target | 2014: 0% reduction compared to 2011-2012 average<br>2015: 1.5% reduction compared to 2011-2012 average | 1.74% of 2008-2012 average annual reduction |
| Overall cap | Absolute cap of 155.4 Mt $CO_2e$ in 153 Mt $CO_2e$ | Absolute cap of 2,084 Mt $CO_2e$ in 2013 |
| Carbon offsets: | | |
| - Quantity | No quantitative limit | During 2008-2020, participants may use carbon offsets up to a maximum of 11% of its 2008-2012 allocation, or, for new participants: 4.5% of their emissions in 2013-2020 |
| - Quality | Domestic offsets allowed (international credits may be allowed in future). | CDM credits from Least Developed Countries (LDCs) allowed. Credits from other CDM and JI projects only eligible if registered before 2013. |
| Price or supply management | No price control measures in current legislation. | Market stability reserve that automatically adjusts the annual supply of allowances based on the surplus in the market. |
| Distribution of allowances | 100% free allocation based on grandfathering (maybe benchmarking after 2016) | Free allocation to industry based on sectoral benchmarks. Full auctioning for power sector. |
| Coverage | Power sector, oil, coal and gas production, mining, chemical industry. Only $CO_2$ | Power sector and energy-intensive industries, intra-EU flights. $CO_2$ + $N_2O$ + PFCs |
| Compliance period | Phase I: 2013, phase II: 2014-2015, phase III: 2016-2020. | 2013-2020 |
| Point of regulation | Downstream | Downstream |
| Banking | No banking allowed between phase I and phase II | Unlimited banking between periods. |
| Penalties | Non-compliance penalty is €40 per ton. | Fine of €100/t$CO_2$. In addition, entities must surrender missing allowances in the following year. |

## Prospects for linking the US Regional Greenhouse Gas Initiative (RGGI) and the EU ETS

The RGGI is the first mandatory emissions trading system in the United States. Nine Northeastern and Mid-Atlantic States[22] cooperate to reduce the $CO_2$ emissions from their power sector through a coordinated cap-and-trade program. The RGGI started auctioning allowances in 2008, while the first three-year control period took effect in 2009.

Soon after the start of the RGGI, it became clear that the cap on allowances was set higher than actual emissions. Updated rules therefore ensured that the 2014 emissions cap of 91 million tons of CO2 was set 45% lower than the 2013 cap of 145 million tons. The cap will further decline by 2.5% annually until 2020, representing a 15% reduction of annual emissions from the 2014 cap[23].

The drop in emissions compared to the cap furthermore led to a surplus of allowances that can be banked to future compliance periods. According to projections, the RGGI estimates that some 140 million surplus allowances were banked up to 2014. To ensure that in the future the targets are met with actual reductions rather than with surplus allowances, the RGGI will reduce the cap each year by a factor that accounts for previously banked (surplus) allowances. This means for example that the 2020 cap of 78 million tons of CO2 will be adjusted downwards to 56 million tons[24].

Most of the recent RGGI auctions have been undersubscribed, which means that not all allowances were sold. The RGGI states decided to retire the unsold allowances in 2012 and 2013, by not reoffering them on the market again.

### Comparison of the RGGI ETS and the EU ETS

Over the years, states have joined and withdrawn from RGGI. In 2007, Maryland joined the RGGI while New Jersey withdrew from the RGGI in 2011. The relative easiness in which states can opt-in and opt-out from the RGGI could endanger linking with other carbon markets because it reduces the credibility and effectiveness of the overall carbon market.

There are other reasons why linking the RGGI with the EU ETS could be problematic. The scope of the two carbon markets is very different, because in contrast to the EU ETS that covers the greenhouse gas emissions of large installations in both the power and industry sector, the RGGI only covers the CO2 emissions of power generators. The EU ETS covers more than 11,000 entities compared to 168 entities under the RGGI.

Besides the scope difference other ETS design differences also act as barriers to linking. The RGGI includes a rather narrow price corridor with a minimum auction price (‹€2) and a cost containment reserve that acts as a price ceiling on auctions (≈€5 in 2015). The EU has opted for the establishment of a market stability reserve that reduces the amount of allowances to be auctioned based on predetermined surplus triggers, instead of directly managing prices. The introduction of a price floor and ceiling is seen to be almost impossible in the European context, since all taxation decisions are subject to unanimity voting in the European Council.

The final main difference between the RGGI and the EU ETS relate to the restriction on offsets. In the RGGI, only offset projects based within RGGI jurisdictions are allowed including afforestation and agricultural projects. These offset projects are not allowed for compliance under the EU ETS. Probably as a result of the low allowance price and the loose cap, currently no offset project has been developed under the RGGI program yet.

The EU's carbon market is considerably larger in terms of carbon emissions covered than the RGGI, which means that the majority of concessions that are necessary to make the two carbon markets compatible need to come from the RGGI states. The nine different RGGI states might however not be willing to make such substantive changes to their carbon market in terms of scope, offset restrictions and price management.

The table below compares the key design features between the RGGI with the EU ETS

| | RGGI ETS | EU ETS |
|---|---|---|
| Stringency of target | 2.5% annual reduction up to 2020 | 1.74% of 2008-2012 average annual reduction |
| Overall cap | Absolute cap of 91 M short tons in 2014 | Absolute cap of 2,084 Mt CO2e in 2013 |
| Carbon offsets: | | |
| Quantity | Participants may use local carbon offsets up to 3.3% of its liabilities. | During 2008-2020, participants may use carbon offsets up to a maximum of 11% of its 2008-2012 allocation, or, for new participants: 4.5% of their emissions in 2013-2020 |
| Quality | Offset projects based within RGGI jurisdictions from several project types including CO2 sequestration due to afforestation, avoided methane emissions from agricultural manure management and US forestry projects. | CDM credits from Least Developed Countries (LDCs) allowed. Credits from other CDM and JI projects only eligible if registered before 2013. |
| Price or supply management | Floor price of $2.05 (≈€1.7) n 2015, increasing annually by 2.5%. Reserve that releases allowances when price reaches $6 in 2015, $8 in 2016 and $10 in 2017. After 2017, the price trigger increases annually by 2.5% | Market stability reserve that automatically adjusts the annual supply of allowances based on the surplus in the market. |
| Distribution of allowances | The clear majority of allowances are auctioned. | Free allocation to industry based on sectoral benchmarks. Full auctioning for power sector. |

| | | |
|---|---|---|
| Coverage | Only the power sector. $CO_2$ only | Power sector and energy-intensive industries, intra-EU flights. $CO_2$ + $N_2O$ + PFCs |
| Compliance period | Third control period: 2015-2017. Fourth period: 2018-2020. | Phase 3: 2013-2020 |
| Point of regulation | Downstream | Downstream |
| Banking | Unlimited banking between periods. | Unlimited banking between periods. |
| Penalties | Fine equal to three times the allowance price for each missing allowance. State-specific penalties may be imposed by member state agencies. | Fine of €100/$tCO_2$. In addition, entities must surrender missing allowances in the following year. |

## Conclusions and recommendations

An analysis of seven existing carbon markets shows that the experience from linking the carbon markets in California and Quebec can provide valuable lessons for any future linkages. Notably, the two regions had very similar policy designs of their carbon markets before linking in 2013. Moreover, in both regions, carbon pricing is only a support measure to increase the effectiveness of complimentary climate policies that allow the governments to retain a degree of control over their climate standards. In addition, several safeguards were introduced in the linked system, including an auction floor price to guarantee a minimum carbon price and holding limits that provide a limit on the amount of surplus allowances that participants can hold to bank for future use.

Similarly, the failed attempt to link the Australian and the EU ETS shows how important it is to have a certain level of trust and cooperation between the jurisdictions. This is critical, both before as well as after linking because regulatory changes to the linked carbon market will need to be developed in close coordination with the other jurisdiction and could hence become more difficult to achieve. Whilst the ambition levels of the Swiss and the EU ETS are relatively similar, there are still some key design features that need to be harmonized before any linking can take place. For example, the Swiss ETS does not include aircraft operators and may allow the use of international offsets after 2020.

The report also looks at the compatibility of the EU ETS with carbon markets in China, South Korea, New Zealand, Kazakhstan and the US RGGI, and finds that there is little prospect of linking the EU ETS to these carbon markets in the near future mainly because of differences in critical design features such as the relative stringency of climate targets, the recognition of carbon offsets and price or supply controls.

The analysis of the design features of emissions trading systems in other parts of the world also shows that other ETS have already learnt from the lessons of the EU ETS, especially how to avoid the build-up of a substantial oversupply of emissions allowances depressing the carbon price to very low levels. In response to the low carbon price in the EU, most other jurisdictions have introduced a floor price on allowances sold at auction to address the risk associated with lower than expected auctioning revenues for example.

Different safeguards against the accumulation of a large amount of surplus allowances were furthermore established in other carbon markets. In addition to the concept of holding unit limits in the Quebec-California ETS to reduce the amount of surplus that participants are able to bank into the future, the US Regional Greenhouse Gas Initiative (RGGI) downwardly adjusts future annual caps by a factor that accounts for previously banked (surplus) allowances to ensure that in the future the climate targets are met with actual reductions rather than with surplus allowances.

Safeguards against a large inflow of low-quality carbon offsets are also tackled in other systems. In California, for example, “buyer liability” rules were created. This means that under the Californian ETS, entities will be held responsible if the offset project did not create meaningful emissions savings, in which case the offset purchaser has to replace the invalidated offsets within six months.

These key design features of carbon markets in other parts the world provide examples of how the EU ETS can be revised. In particular the EU ETS could adopt from other mechanisms:

- Provisions to safeguard the auctioning revenues of EU governments, e.g. by introducing an auction floor price.
- Measures to limit the oversupply of emissions allowances that can be banked for future use, e.g. by introducing holding limits or implementing a mechanism to reduce future caps for banked surplus allowances.
- Safeguards against the use of low-quality international offsets until 2020, e.g. by making public the amount and type of offset credits that EU ETS participants have used and by introducing rules that make the offset buyer liable for environmental or social problems associated with the offset projects.

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7. *PIK (2008)*
8. *PIK (2008)*
9. *E.g. on the basis of historic emissions*
10. *PIK (2008)*
11. *Design features include the stringency of the target, the use of carbon offsets, the price or supply management, the distribution of allowances, the coverage, the compliance period, the point of regulation, banking and borrowing rules and penalties*
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