Costs and effectiveness of domestic offset schemes

Final report

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By: Bram Borkent, Siobhan O'Keeffe, Maarten Neelis and Alyssa Gilbert
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Foreword

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The Ministry of Infrastructure and Environment has appointed Ecofys to carry out a study on the potential effectiveness of a domestic offsetting scheme within the Netherlands to reduce emissions in the sectors of the economy in the Netherlands that are not covered by the EU Emission Trading system (EU ETS).

The study is motivated by the resolution Van der Werf agreed by the House of Representatives in December 2011. The motion acknowledges that the ETS Directive (Article 24a) provides a possibility for non-ETS sectors to receive emission credits. Such an increased incentive for domestic emission reductions could provide opportunities for the Dutch market, according to the resolution. Considering that emissions trading should be implemented with great care in order to realise the anticipated impact and to prevent disruption of the system, the government is requested to study possible conditions for assigning credits to non-ETS sectors, taking into account costs and benefits, the expected impact on the present climate policy for non-ETS companies and the expected effect on CO_2-emission reductions and CO_2-prices.

A domestic offsetting scheme can take several different forms depending on design choices made by policy makers. The design choices influence the overall effectiveness of the scheme, and therefore the potential overall contribution of the mechanism to the national emissions reduction targets. Considering that a domestic offsetting scheme allowing ETS-credits to be assigned to non-ETS sectors is only one of the possible design options, this report examines to what extent different domestic offsetting systems could be an attractive climate instrument in the Dutch context. It tries to answer the central question whether domestic offsetting could contribute in a meaningful way to emission reductions in the non-ETS sectors in the Netherlands, and if so, which design options are most likely to do so.

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Executive summary

Motivation and research question

The Ministry of Infrastructure and Environment has assigned Ecofys to carry out a study on the costs, benefits and effectiveness of a domestic offsetting scheme within the Netherlands to reduce greenhouse gas (GHG) emissions in the sectors of the economy in the Netherlands not covered by the EU Emission Trading system (EU ETS). These sectors not included in the EU ETS are referred to as 'non-ETS' sectors.

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Central research question

What are the costs, benefits as well as the effectiveness of different domestic offsetting systems?

Cost-effective reduction potential available for domestic offsetting is small

How much greenhouse gas reduction potential is available in the non-ETS sectors in the Netherlands which can potentially be tapped cost-effectively by a domestic offsetting scheme? The analysis is based on potentials and costs from different measures as determined by ECN/PBL in their latest Optiedocument 2020, with respect to a reference scenario of adopted policies in place by 2010.

We start from the principle that only emission reductions in the non-ETS sectors (filter 1) are eligible for a domestic offsetting scheme. Also the reductions should not be more expensive than € 30/tCO_2 (filter 2), should be realizable by private sector parties (filter 3), and should be additional to those that already take place under existing policies (filter 4). Using these filters, 20 options remain available with a total technical cost-effective reduction potential of 4.6 MtCO_2. This potential does not change significantly when other CO_2 price assumptions are applied up to a level of € 45/tCO_2. It is interesting to note that most options identified have negative costs meaning that most likely, rather than costs, other barriers exist to realize these measures.

A large share of the technical cost-effective reduction potential will not be harvested due to barriers related to transactions costs and (im)possibilities related to establishing baselines and monitoring methodologies on project level, which are essential to ensure that only real additional reductions are credited under the scheme. We estimate that the maximum emission reduction potential due to these practical implementation barriers boils down to a range of 0.5 – 1.0 MtCO_2, which is smaller than 1% of current non-ETS emissions.

Experiences in other EU countries confirm that the volume of reductions achieved by domestic offsetting schemes is often limited, especially taking into account that most significant point sources of emissions (e.g. N_2O point sources) are already included in the EU ETS after 2012 and as such not available for a future domestic offsetting scheme in the Netherlands.

Three design options of domestic offsetting

Nevertheless, if a domestic offsetting scheme is pursued, which design option could potentially realize emission reductions in a cost-effective manner? Three design options are studied:

1. **Article 24a:** Under an Article 24a approach the domestic offset programme would serve as a mechanism to provide more flexibility for EU ETS participants, while simultaneously incentivising emissions reductions in non-ETS sectors. This approach is dependent on an agreement at the European level that this Article should be used, and relies on further legislation to be implemented. In this mechanism private investors pay for the emission reductions generated in non-ETS entities and credits or allowances (eligible for use within the EU ETS) are issued at the expense of an equivalent amount of AEAs (national non-ETS emission allowances). Administration costs for the government are estimated to be at least € 250,000 annually.
2. **Government buyer option:** Two variants exist:
   a) The government would commit to pay for the reductions generated by a domestic offset scheme, and subsequently, the government then sells an amount of AEAs equivalent to the reductions realised by the project, in order to recoup the money paid to the project developer.
   b) The reverse of option a): the government would first sell an amount of AEAs, and then use the capital generated to fund domestic emission reductions. In these options, the government would have to undertake design of the processes and methodologies needed for screening and verifying the reductions realised. This makes this option a very costly one, with estimated administration costs of € 1 - 1.5 million/yr. Also the government is dependent on AEA demand, which is expected to be low.
3. **Voluntary market option:** In this approach, the government would accept the implementation of projects using a voluntary carbon credit standard (e.g. Gold Standard, VCS). Project developers may be incentivised to undertake projects in exchange for internationally recognised credits. For all VERs generated the government would need to cancel an AEA, in order to avoid double counting, as required by most standards. The voluntary market option has the advantage that the Netherlands can implement it independently of other countries' considerations. Furthermore it responds to the wish observed by some stakeholders to offset emissions via the voluntary market with domestic rather than international projects. Also, the voluntary market is relatively well-established and stable, although large scale application of voluntary projects in Annex I countries could influence the demand and supply balance on this market. The exact demand for domestic projects in the voluntary market is something that needs more detailed research. The last and from climate-perspective the most important advantage is that the voluntary market design option accomplishes a global net mitigation effect, in contrast to the other options.

Administration costs for the government are estimated to be in the order of € 250,000 – 300,000 annually.

From a pro-con analysis on the three design options, we conclude that the government buyer option is not recommended due to the high up-front costs and the dependence on AEA demand from other Member States, which is forecasted to be low.
From the two remaining options the voluntary market option has more advantages than the Article 24a option. The administrative costs to the government are in the same order of magnitude for both options. Although large scale application of voluntary projects in Annex I countries could influence the demand and supply balance on this market, the exact demand for domestic projects in the voluntary market is something that needs more detailed research.

Domestic offsetting does not directly contribute to reaching the 2020 CO_2 target, but could contribute to long term climate commitments
All three domestic offsetting schemes studied will, based on the assumptions, not directly contribute to reaching the Dutch non-ETS emission reduction targets in the short term (e.g. during the crediting period of projects). This is because the resulting credits are either used for compliance in the ETS market (Art. 24a option) or are sold in the voluntary market (voluntary market option) under the cancellation of an equivalent amount of assigned units to the Netherlands, which is essential to avoid double-counting of emission reductions. In the government buyer option, the Netherlands sells the surplus of assigned units to other countries. Hence, all options do not help the Netherlands in reaching its short term non-ETS target. Opportunities to ensure a positive contribution to the Dutch non-ETS targets in the short term exist, but are not discussed in this study.

Beyond the crediting period of the projects (typically no longer than 10 years), domestic offsetting could however contribute to the long term (2030 or 2050) commitments of the Netherlands and could incentivise innovation and the involvement of the private sector in domestic emission reductions.
In this context it is interesting to note that, according to the latest analyses from ECN/PBL, the non-ETS target for 2020 is currently within range. However, existing and intended policies are not sufficient to reach the conditional pledge of 40% emission reduction in the Netherlands in 2030 compared to 1990. However, before concluding that for this reason, domestic offsetting is an attractive policy option to consider, domestic offsetting should at least be compared to other possible policy instruments to tap the available non-ETS emission reductions potential, an analysis beyond the scope of the present study.

Conclusion
The realistic emission reduction potential which could be tapped by domestic offsetting in the Netherlands is smaller than 1% of current non-ETS emissions. All three domestic offsetting schemes studied will, based on the assumptions, not directly contribute to reaching the Dutch non-ETS emission reduction targets in the short term, while it could in the long term (>10 year). Whether it is a suitable policy instrument for realizing emission reductions in the long term (2030 and beyond) is a question we recommend to be further studied in comparison with other policy instruments and in relation to the barriers that prevent existing cost-effective reduction potentials from being realised.

Background

- **What is domestic offsetting?**

Domestic offsetting, in its strictest sense, is the purchase of emissions reduction credits generated in one sector by an entity from another sector within the same country. However current discussion of domestic offsetting in the EU has adopted a slightly broader definition. In this context the term domestic offsetting can also be used to describe credits generated by emissions reduction projects in sectors not included in the EU ETS, that can then be sold anywhere in the EU, amongst other to ETS companies.

- **Without Kyoto successor no legal framework for Joint Implementation**

In order to fully assess the potential impact a domestic offsetting scheme could have in the Netherlands it is important to understand the existing policy landscape. During the last UN climate change conference in Durban in November and December 2011 a draft decision was proposed that a number of Parties (excluding Russia, Japan and Canada) will commit to a 2nd Commitment Period (CP), running from 2013 to 2017 or 2020. The 17th Conference of the Parties, however, failed to officially adopt the proposed decision and forwarded decisions, in particular on country-specific reduction targets, to the next Conference of the Parties in Doha, late 2012. Therefore, at the moment of writing this report, it is unclear whether CP1 will be succeeded by a second commitment period with legally-binding targets (CP2).

Without a 2nd commitment period under the Kyoto Protocol there will no longer be a legal framework for the trading mechanism of national allowances under Kyoto (AAUs). Other countries outside the EU may also set up national or bilateral schemes to reduce emissions, but the globally recognised, UN-approved AAUs, will cease to exist. This may have knock-on implications for other mechanisms. Most notably, it puts the future of the Joint Implementation (JI) framework in a highly uncertain situation. This is because JI credits and AAUs are linked to each other, and in the absence of AAUs it is highly uncertain whether new JI credits will be able to be issued.

- **Non-ETS allowances (AEAs) are relevant for domestic offsetting**

From 2013 onwards, the European Commission will allocate Member States with a new type of allowance known as an Annual Emission Allocation (or AEA), in line with national caps on non-ETS emissions. The total amount of AEAs distributed among all Member States is equivalent to the total European cap on non-ETS emissions, as specified in the Effort Sharing Decision, and this will exist either with or without the existence of underlying AAUs. The AEA allowances can be traded between governments (over-the-counter) depending on which countries have a surplus amount of AEAs, and which countries have a shortage. Similarity between AAUs and AEAs can sometimes lead to confusion in distinguishing their specific roles and remits. The key difference is that AAUs relate to a cap on a country's total national emissions, while AEAs relate to a cap on an EU Member State's non-ETS emissions only.

- **Voluntary markets**

A separate market, called the voluntary market, is comprised of credits that cannot be used for compliance with targets or obligations, but for philanthropic or marketing purposes. The two most widely known voluntary standards are the Gold Standard and the Verified Carbon Standard (VCS). Both of these standards allow projects to take place in Annex 1 countries, although the Gold Standard requires that an amount of AAUs equivalent to those generated by a project is cancelled. Note that the Gold Standard administers both CDM projects and voluntary market projects. Only voluntary Gold Standard projects may take place in Annex 1 countries (CDM Gold Standard is not eligible). The Dutch government only allows the Gold Standard and CDM-equivalent projects for offsetting its own emissions, setting a good practice example for the voluntary market.
The voluntary market can be considered as a well-established and relatively stable market.

- **Experiences of other countries**

Several other countries have already established domestic offsetting schemes. In Europe, domestic offsetting is implemented via a JI-like mechanism. The JI framework is not the only way to create domestic offset credits, but many governments have chosen to do so as it constitutes a robust, established framework that the government can use rather than carry the cost of implementing a new framework.
From the observed offsetting schemes the following lessons can be drawn:

1. There is experience of a wide variety of project types.
2. Domestic JI projects have delivered reductions, but the scope for future domestic JI projects is uncertain.
3. Non-JI project volumes are low.
4. Transaction costs can be a real barrier to implementation.
5. Emissions reductions within agriculture are challenging due to the lack of eligible project methodologies, the cost of developing such methodologies, and the high marginal abatement costs within the sector.

Samenvatting

Aanleiding en onderzoeksvraag

Het Ministerie van Infrastructuur en Milieu heeft Ecofys opdracht gegeven om een onderzoek uit te voeren naar de kosten, baten en effectiviteit van een 'domestic offset' systeem in Nederland om daarmee een reductie te realiseren van broeikasgasemissies in 'niet-ETS' sectoren, dat wil zeggen: sectoren in Nederland die niet gedekt worden door het Europese systeem van emissiehandel (het EU-ETS).

Deze studie is gemotiveerd door de motie Van der Werf, die in december 2011 werd aangenomen door de Tweede Kamer der Staten Generaal. De motie erkent dat de ETS Verordening (in artikel 24a) een mogelijkheid biedt aan niet-ETS sectoren om emissierechten te verwerven. Ervan uitgaande dat een domestic offset systeem waarbij emissierechten uit het EU-ETS toegewezen worden aan niet-ETS sectoren slechts één van de mogelijke ontwerpen is, onderzoekt dit rapport in welke mate verschillende domestic offset systemen een aantrekkelijk klimaatbeleidsinstrument zouden zijn voor Nederland.

Centrale onderzoeksvraag

Wat zijn de kosten, baten en effecten van verschillende zogenoemde 'domestic offset' systemen?

Het kosteneffectieve reductiepotentieel beschikbaar voor domestic offsetting is klein

Hoeveel broeikasgasemissiereductiepotentieel is beschikbaar in Nederlandse niet-ETS sectoren, welke op rendabele wijze aangeboord worden door een domestic offset systeem? De analyse is gebaseerd op berekeningen van potentiëlen en kosten van verschillende maatregelen, zoals bepaald door ECN/PBL in het laatste Optiedocument 2020 met betrekking tot een referentiescenario van bestaand beleid in 2010.

We gaan uit van het principe dat alleen emissiereducties in de niet-ETS sectoren (filter 1) in aanmerking komen voor een domestic offset systeem. Ook zouden de emissiereducties niet duurder moeten zijn dan € 30/tCO_2 (filter 2), moeten ze realiseerbaar zijn door private partijen (filter 3) en dienen ze een aanvulling te zijn op maatregelen die reeds plaatsvinden onder het huidige beleid (filter 4). Met behulp van deze filters blijven 20 opties beschikbaar met een totaal technisch kosteneffectief reductiepotentieel van 4,6 miljoen tCO_2. Dit potentieel verandert niet significant wanneer andere CO_2-prijzen tot een niveau van € 45/tCO_2 verondersteld worden. Het is opmerkelijk dat het gros van de geïdentificeerde opties negatieve kosten hebben, wat betekent dat hoogstwaarschijnlijk niet de financiële kosten, maar andere oorzaken de realisatie van deze maatregelen belemmeren.

Een groot deel van het technisch kostenreductiepotentieel zal niet worden gerealiseerd vanwege barrières die worden opgeworpen door transactiekosten en door de (on)mogelijkheden op het gebied van het vaststellen van baselines en meetmethoden op projectniveau. Deze zijn essentieel om te garanderen dat alleen echte extra reducties begunstigd worden met emissierechten. Wij schatten in dat door deze praktische uitvoeringsbelemmeringen het maximale emissiereductiepotentieel ongeveer 0,5 tot 1,0 $MtCO_2$ is; dit is minder dan 1% van de hoeveelheid emissies in de niet-ETS sectoren. Ervaringen in andere EU-landen bevestigen dat het volume van de reducties gerealiseerd door domestic offset regelingen vaak beperkt is, vooral gezien het feit dat de belangrijkste puntbronnen van emissies (bijvoorbeeld N_2O puntbronnen) zijn opgenomen in het EU-ETS na 2012 en als zodanig niet meer beschikbaar zijn voor een toekomstig domestic offset systeem in Nederland.

Drie mogelijke ontwerpen van domestic offsetting

Indien een domestic offset regeling zou worden nagestreefd, welk ontwerp zou dan op een kosteneffectieve manier emissiereducties bewerkstelligen? Wij hebben drie ontwerpopties bestudeerd:

1. **Artikel 24a**: Op grond van een aanpak volgens artikel 24a zou een domestic offset regeling een mechanisme zijn om meer flexibiliteit te bieden aan EU-ETS deelnemers, terwijl tegelijkertijd emissiereducties in niet-ETS sectoren gestimuleerd zouden worden. Deze aanpak is afhankelijk van een akkoord op Europees niveau over het verder uitwerken van dit artikel en zou leunen op verdere (nog te ontwikkelen) uitvoeringsmaatregelen. In dit mechanisme betalen particuliere investeerders voor de emissiereducties die gerealiseerd worden in niet-ETS entiteiten en emissierechten (die in aanmerking komen voor gebruik binnen het EU-ETS) worden uitgegeven ten koste van een equivalente hoeveelheid AEA's (nationale niet-ETS emissietoelage van de overheid). Administratiekosten voor de overheid worden geschat op jaarlijks ten minste € 250.000.
2. **Overheid-als-koper optie**: Er bestaan twee varianten:
   a) de overheid verplicht zichzelf om te betalen voor de emissiereducties die gerealiseerd worden door de domestic offset regeling en vervolgens verkoopt de overheid een evenredige hoeveelheid AEA's (gelijk aan de reducties gerealiseerd door het project) om zodoende het geld terug te verdienen dat is betaald aan de projectontwikkelaar.
   b) Het omgekeerde van optie a): de overheid verkoopt eerst een hoeveelheid AEA's en gebruikt vervolgens dit geld om binnenlandse emissiereducties te financieren. In deze optie zou de overheid verantwoordelijk zijn voor het ontwerp van processen en methoden die nodig zijn voor het screenen en controleren van de gerealiseerde reducties. Dit maakt deze optie een zeer kostbare, met geschatte administratiekosten van € 1 tot 1,5 miljoen/jaar. Daarnaast is de overheid in deze optie afhankelijk van vraag naar AEA's, terwijl uit recente analyses blijkt dat er bijna geen vraag zal zijn omdat EU-lidstaten tot 2020 geen AEA's tekort komen.
3. **Vrijwillige markt optie**: In deze benadering zou de overheid de uitvoering van projecten stimuleren door een standaard uit de vrijwillige markt (bijvoorbeeld Gold Standard, VCS) te accepteren. Projectontwikkelaars kunnen worden gestimuleerd om projecten uit te voeren in ruil voor internationaal erkende rechten van de vrijwillige markt. Voor alle gegenereerde VER's zou de overheid, om dubbeltellingen te vermijden, een AEA moeten annuleren zoals

vereist door de meeste normen. De vrijwillige markt optie heeft als voordeel dat Nederland het onafhankelijk van andere landen kan uitvoeren. Verder speelt deze optie in op de wens van sommige stakeholders om emissies via de vrijwillige markt met binnenlandse in plaats van internationale projecten te compenseren. Daarnaast is de vrijwillige markt een relatief stabiele markt, hoewel grootschalige toepassing van vrijwillige projecten in annex I landen de vraag- en aanbodbalans op deze markt kan beïnvloeden. De exacte vraag naar binnenlandse projecten in de vrijwillige markt heeft meer gedetailleerd onderzoek nodig. Het laatste en vanuit klimaatperspectief belangrijkste voordeel is dat de vrijwillige markt optie een globaal netto mitigatie effect bewerkstelligt, in tegenstelling tot de andere opties. Administratiekosten voor de overheid zijn naar schatting in de orde van € 250.000 - 300.000 per jaar.

Als we de voor- en nadelen op een rij zetten, kunnen we concluderen dat de overheid-als-koper optie niet aanbevolen is, vanwege de hoge initiële kosten en de afhankelijkheid van de vraag naar AEAs die waarschijnlijk laag zal zijn.

Van de twee resterende opties biedt de vrijwillige markt optie meer voordelen dan de artikel 24a-optie. De administratieve kosten voor de overheid zijn in dezelfde orde van grootte voor beide opties. Hoewel grootschalige toepassing van vrijwillige projecten in annex I landen invloed kan hebben op de vraag- en aanbodbalans op deze markt, is de precieze vraag naar binnenlandse projecten in de vrijwillige markt iets dat nader onderzoek nodig heeft.

Domestic offsetting draagt niet direct bij aan het bereiken van de CO_2-doelstelling voor 2020, maar zou kunnen bijdragen aan lange termijn klimaatverplichtingen

De drie beschreven domestic offsetting opties zullen, op basis van de veronderstellingen, niet direct bijdragen aan het bereiken van de Nederlandse niet-ETS emissiereductie doelstellingen op de korte termijn (specifiek: tijdens de kredietperiode van projecten). Dit komt omdat de resulterende emissierechten ofwel worden gebruikt in de ETS-markt (art. 24a optie), ofwel worden verkocht in de vrijwillige markt (vrijwillige markt optie) onder de annulering van een equivalente hoeveelheid AEA's van de Nederlandse overheid. Dit laatste is van essentieel belang om dubbeltelling van emissiereducties te voorkomen. In de overheid-als-koper optie verkoopt Nederland het overschot aan AEA's aan andere landen. Kortom, geen van de opties zullen Nederland helpen in het bereiken van de korte termijn doelstelling op het gebied van niet-ETS emissies. Er bestaan weliswaar mogelijkheden om een positieve bijdrage aan de Nederlandse korte termijn niet-ETS doelstellingen te garanderen, maar deze worden niet behandeld in deze studie.

Na de kredietperiode van de projecten (meestal niet langer dan 10 jaar) kan domestic offsetting echter een positieve bijdrage leveren aan het behalen van de lange termijn (2030 of 2050) klimaatdoelstellingen van Nederland. Daarnaast kan het innovatie en de betrokkenheid van de particuliere sector stimuleren op het gebied van binnenlandse emissiereducties.

In deze context is het interessant om op te merken dat, volgens de meest recente analyses van ECN/PBL, de niet-ETS doelstelling voor 2020 op dit moment binnen bereik is. Echter, het bestaande en beoogde beleid zijn niet voldoende om de voorwaardelijke belofte van 40% emissiereductie in Nederland in 2030 ten opzichte van 1990 te bereiken. Alvorens te concluderen dat om deze reden domestic offsetting een aantrekkelijk beleidsoptie zou zijn, zou dit beleidsinstrument op zijn minst moeten worden vergeleken met andere mogelijke beleidsinstrumenten om het beschikbare emissiereductie potentieel in de niet-ETS sectoren te realiseren; een analyse die buiten het bestek van de huidige studie ligt.

Conclusie

Het realistisch emissiereductiepotentieel dat kan worden aangeboord voor domestic offsetting in Nederland is kleiner dan 1% van de huidige niet-ETS emissies. Alle drie onderzochte domestic offset varianten dragen, op basis van de gebruikte veronderstellingen, niet direct bij aan het bereiken van de niet-ETS klimaatdoelstellingen van Nederland op de korte termijn; op de lange termijn (>10 jaar) zou de regeling wel kunnen bijdragen. Of domestic offsetting een geschikt beleidsinstrument is om emissiereducties op de lange termijn (2030 en verder) te realiseren, is een vraag die we aanbevelen verder te onderzoeken. Daarbij zouden andere beleidsinstrumenten en de barrières die verhinderen dat het bestaande kosteneffectieve reductiepotentieel wordt gerealiseerd, meegenomen moeten worden.

Achtergrond

- **Wat is domestic offsetting?**

Domestic offsetting, in de meest strikte zin, is de aankoop van emissiereductie kredieten, die zijn verworven binnen een bepaalde sector, door een instantie uit een andere sector binnen hetzelfde land. De huidige discussie over domestic offsetting in de EU heeft geleid tot een iets bredere definitie: in deze context kan de term domestic offsetting refereren aan het genereren van emissiereductiekredieten in sectoren die niet onder het EU-ETS vallen, die vervolgens overal in de EU kunnen worden verkocht, onder andere aan ETS bedrijven.

- **Zonder Kyoto opvolging geen wettelijk kader voor Joint Implementation**

Om de potentiële impact van een domestic offset regeling ten volle te kunnen beoordelen voor Nederland is het belangrijk om het bestaande beleidslandschap te begrijpen. Tijdens de laatste VN-conferentie over klimaatverandering in Durban (november en december 2011) werd in een ontwerp-besluit voorgesteld dat een aantal partijen (met uitzondering van Rusland, Japan en Canada) zich zal inzetten voor een tweede verbintenisperiode (commitment period, CP), lopende van 2013 tot 2017 of tot 2020. Het lukte de VN-klimaatconferentie echter niet om het voorgenomen besluit officieel vast te stellen en daardoor werden de beslissingen doorgeschoven, met name op het gebied van nationale reductiedoelstellingen, naar de volgende VN-klimaatconferentie in Doha, eind 2012. Daarom is het, op het moment van schrijven van dit rapport, onduidelijk of CP1 zal worden opgevolgd door een tweede verbintenisperiode met juridisch bindende doelstellingen (CP2).

Zonder een tweede verbintenisperiode in het kader van het Kyoto-protocol is er niet langer een wettelijk kader voor het verhandelen van nationale emissierechten (AAU's) in het kader van Kyoto.

Andere landen buiten de EU zouden ook nationale of bilaterale regelingen om de uitstoot te verminderen kunnen opzetten, maar de wereldwijd erkende AAU's zullen ophouden te bestaan. Dit kan vergaande gevolgen hebben voor andere mechanismen. Het meest opvallende is wel dat de toekomst van het Joint Implementation (JI) kader in een zeer onzeker daglicht komt te staan. Dit komt omdat JI-rechten en AAU's met elkaar verbonden zijn en in afwezigheid van AAU's is het zeer onzeker of nieuwe JI-rechten kunnen worden afgegeven.

- **Niet-ETS emissieruimte (AEA's) is relevant voor domestic offsetting**

Vanaf 2013 zal de Europese Commissie aan lidstaten een nieuw type jaarlijkse emissieruimte toewijzen, bekend als 'Annual Emission Allocation' (of AEA), in overeenstemming met de nationale emissieplafonds op niet-ETS emissies. De totale hoeveelheid AEA's verdeeld over alle lidstaten is gelijk aan het totale Europese plafond voor niet-ETS emissies, zoals gespecificeerd in de Effort Sharing Decision. De toewijzing van AEA's zal plaatsvinden met of zonder de aanwezigheid van onderliggende AAU's. De AEA emissierechten kunnen worden verhandeld tussen overheden ('over-the-counter'), afhankelijk van welke landen een overschot of een tekort aan AEA's hebben. Overeenkomsten tussen AAU's en AEA's kunnen soms tot verwarring leiden in het onderscheiden van hun specifieke functies en bevoegdheden. Het belangrijkste verschil is dat AAU's betrekking hebben op het totale een emissieplafond van een land, terwijl AEA's alleen betrekking hebben op een plafond op het niet-ETS deel van een EU-lidstaat.

- **Vrijwillige markten**

Een afzonderlijke markt, genaamd de vrijwillige markt, bestaat uit emissierechten die niet kunnen worden gebruikt voor naleving van doelstellingen of verplichtingen, maar voor filantropische of marketing doeleinden. De twee meest bekende vrijwillige standaarden zijn de Gold Standard en de Verified Carbon Standard (VCS). Beide standaarden staan projecten toe in Annex 1-landen, hoewel de Gold Standard vereist dat een aantal AAU's - gelijk aan de reducties die worden gerealiseerd in een project - worden geannuleerd door de overheid. Wij merken op dat de Gold Standard zowel CDM-projecten als vrijwillige markt projecten beheert. Alleen vrijwillige Gold Standard-projecten kunnen plaatsvinden in Annex 1-landen (CDM Gold Standard komt niet in aanmerking). De Nederlandse overheid staat alleen de Gold Standard-en CDM-equivalente projecten toe voor de compensatie van de eigen uitstoot, waarmee zij een goed voorbeeld aan de markt geeft.
De vrijwillige markt kan worden beschouwd als een gevestigde en relatief stabiele markt.

- **Ervaringen van andere landen**

Verschillende andere landen hebben reeds domestic offset regelingen. In Europa wordt domestic offsetting geïmplementeerd via een JI-achtig mechanisme. Het JI-kader is niet de enige manier om domestic offset rechten te creëren, maar veel regeringen hebben ervoor gekozen om dit te doen omdat het een robuust, gevestigd kader is dat de overheid kan gebruiken, waarbij kosten worden bespaard die gepaard zouden gaan bij de ontwikkeling en implementatie van een nieuw kader.

Van de waargenomen domestic offset regelingen kunnen de volgende lessen worden getrokken:

1. Er is ervaring met allerlei soorten projecten.

2. Binnenlandse JI-projecten hebben echte reducties opgeleverd, maar de mogelijkheden voor toekomstige binnenlandse JI-projecten is onzeker.
3. Niet-JI projectvolumes zijn laag.
4. Transactiekosten kunnen een echte barrière voor de uitvoering zijn.
5. Emissiereducties binnen de landbouw zijn lastig, wat te wijten is aan het gebrek aan methodieken die in aanmerking komen voor domestic offsetting, de kosten van de ontwikkeling van deze methoden en de hoge marginale reductiekosten binnen de sector.

ECOFYS
sustainable energy for everyone

Table of contents

1 Introduction

The Ministry of Infrastructure and Environment has assigned Ecofys to carry out a study on the potential effectiveness of a domestic offsetting scheme within the Netherlands to reduce greenhouse gas (GHG) emissions in the sectors of the economy in the Netherlands not covered by the EU Emission Trading system (EU ETS). These sectors not included in the EU ETS are referred to as 'non-ETS' sectors.

Domestic offsetting, in its strictest sense, is the purchase of emissions reduction credits generated in one sector by an entity from another sector within the same country. However current discussion of domestic offsetting in the EU has adopted a slightly broader definition. In this context the term domestic offsetting can also be used to describe credits generated by emissions reduction projects in sectors not included in the EU ETS, that can then be sold anywhere in the EU.

A DO scheme might be set up in order to provide finance for emissions reductions in a particular project host sector, or to allow for obligated parties to meet their targets through investing in sectors where emissions reductions may be cheaper to realize than in their own. Another driver could be the use of domestic offsetting as a cost effective alternative to measures such as subsidies or grants. Domestic offsetting can also act as a search function to find 'low hanging' abatement opportunities that have not yet been exploited. While domestic offsetting generally occurs at a national level, similar mechanisms are also used at the international level for countries and companies with Kyoto obligations. In these international mechanisms, the credits generated by a project in one country are sold to an entity located in another country. Apart from differences in scope, domestic offset and international offset schemes operate on very similar principles, and the more established international mechanisms can offer some useful frameworks for guidance in the establishment of new domestic offset schemes.

Furthermore, several countries, both in the EU and outside, have already implemented domestic offset schemes. As these countries show, and as we will demonstrate in this report, a domestic offsetting scheme can take several different forms depending on design choices made by policy makers. For example, domestic offset schemes can be driven by investment by private entities or by the government. Equally, domestic offset can be restricted to a national level (buyers and sellers are all located within the same country), or more widely at an intra-European level, via Article 24a of the revised EU ETS Directive. This last possibility was the main driver to assign this study. In December 2011, the resolution Van der Werf was agreed by the House of Representatives. The resolution acknowledges that the ETS Directive (Article 24a) provides a possibility for non-ETS sectors to receive emission credits. Such an increased incentive for domestic emission reductions could provide opportunities for the Dutch market, according to the resolution.

Considering that emissions trading should be implemented with great care in order to realise the anticipated impact and to prevent disruption of the system, the government is requested to study possible conditions for assigning credits to non-ETS sectors, taking into account costs and benefits, the expected impact on the present climate policy for non-ETS companies and the expected effect on CO_2-emission reductions and CO_2-prices.

This report seeks to answer the central question of whether domestic offsetting could be an attractive climate policy instrument for the Netherlands in contributing to emission reductions in the non-ETS sectors, and if so, which design options would be most attractive? We seek to begin to answer these questions by first sketching in Chapter 2 the context of the international carbon markets in the post 2012 period. In this Chapter, we also present a definition of domestic offsetting. In Chapter 3, we zoom in on other countries' experiences with domestic offsetting to draw lessons for the Dutch situation. In Chapter 4, we present the main principles to which the available reduction potential in the non-ETS in the Netherlands should be subjected (no double-counting, additionality, etc.) based on the ECN option document 2020. In Chapter 5 we define three different design options for a domestic offsetting scheme. In Chapter 6, we try to combine the evidence built up in the previous chapters to analyse and discuss the pros and cons of a domestic offsetting scheme in the Netherlands. In the final chapter 7 we draw a conclusion to the question of whether domestic offsetting could be an attractive measure to contribute to emissions reductions in Dutch non-ETS sectors.

Before publication this report has been discussed during a limited stakeholder consultation, in which a selection of relevant stakeholders was invited to ask technical questions about the study. A summary of the technical questions and responses are included in Appendix 2. The selected stakeholders involved were: VNO-NCW, the Dutch Green Building Council, Essent, Energy Valley, LTO Noord and NZO.

We would like to stress that this report is written in a concise manner targeted for a non-specialised but informed audience.

2 Carbon markets in the post-2012 period

What are the possible options for carbon credit based mechanisms beyond 2012?

2.1 The global carbon market context

In order to fully assess the potential impact a domestic offsetting scheme could have in the Netherlands it is important to understand the existing policy landscape. This context will set out the stage for the design options of domestic offsetting and will therefore be relevant when assessing the impact of the different options.

Climate change is a global problem, and an international framework has been established to mitigate anthropogenic causes of climate change. The UN Framework Convention for Climate Change is an international environmental treaty signed in 1992 and entered into force in 1994. With 195 countries that ratified the Convention, it has near-universal membership. The aim of the Convention is to stabilise greenhouse gas emissions in the atmosphere at levels that will prevent "dangerous anthropogenic interference with the climate system".

In order to operationalize this objective, the legally binding Kyoto Protocol was adopted in 1997. The Protocol set out legally-binding greenhouse gas reduction targets, or caps, to 37 industrialised countries and the European Community, based on the principles of the Convention. The Protocol set out reporting and verification procedures and a compliance system for its first commitment period, which has run from 2008-2012. The Protocol also introduced a number of market-based mechanisms to help capped countries meet these targets:

- **International Emissions Trading:** Capped countries are provided with allowances equivalent to their cap on emissions. If they emit less than the cap they can sell their surplus allowances. If they emit more than the cap they must buy allowances from countries which have a surplus. The allowances allocated to capped countries are called Assigned Amount Units, or AAUs.

- **Joint Implementation (JI):** Under this mechanism capped countries also have the option to invest in emissions reduction projects in another capped country, where reductions may be cheaper, and count these reductions towards their own target. Emissions reductions from these projects are awarded carbon credits, equivalent to each 1 ton of CO_2e reduced. Credits generated under this mechanism are known as Emission Reduction Units (ERUs). These credits can be counted towards Kyoto targets.

- **Clean Development Mechanism (CDM):** Similar to JI, except that projects are hosted in countries without a Kyoto cap. Credits generated under this mechanism are called Certified Emission Reductions (CERs).

Units used in International Emissions Trading are known as allowances, while the units used in CDM or JI are known as credits. The difference between allowances and credits is that allowances are distributed a priori to participants within an emissions trading scheme and represent a right to emit a quantity of emissions. Credits are generated ex post following activity to reduce emissions below a project baseline and represent a reduction in emissions. For example, countries are allocated allowances at the beginning of the Kyoto Protocol Commitment Period, and may subsequently trade these depending on whether they have a shortage or surplus relative to their emissions. Under the CDM and JI mechanisms, carbon credits are assigned to project developers equivalent to the reductions they achieve via their projects. At the beginning of the project a baseline is established for business as usual emissions. Reductions achieved by the project will be measured against this baseline. The project-based mechanisms such as CDM and JI are therefore also known as baseline and credit schemes.

Carbon credits can also be used as offsets, as they are bought to compensate, or 'offset', emissions made by the buyer. For example, a travel agency in the Netherlands may buy offsets generated from a CDM project in India in order to compensate the emissions made by the travel agency over the course of its daily operations.

The targets established under the Kyoto Protocol came into effect in 2008 and are due to expire at the end of 2012. This period 2008 – 2012 is known as the 1st Commitment Period (CP1). During the last UN climate change conference in Durban in November and December 2011 a draft decision was proposed that a number of Parties (excluding Russia, Japan and Canada) will commit to a 2nd Commitment Period, running from 2013 to 2017 or 2020[1]. The 17th Conference of the Parties, however, failed to officially adopt the proposed decision[2] and forwarded decisions, in particular on country-specific reduction targets, to the next Conference of the Parties in Doha, late 2012.

Therefore, at the moment of writing this report, it is unclear whether CP1 will be succeeded by a second commitment period with legally-binding targets (CP2). Both possible scenarios will be further illustrated and discussed.

[1] http://unfccc.int/files/meetings/durban_nov_2011/decisions/application/pdf/awgkp_outcome.pdf (accessed 12 July 2012).
[2] For an overview of decisions adopted by COP17, see: http://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf.

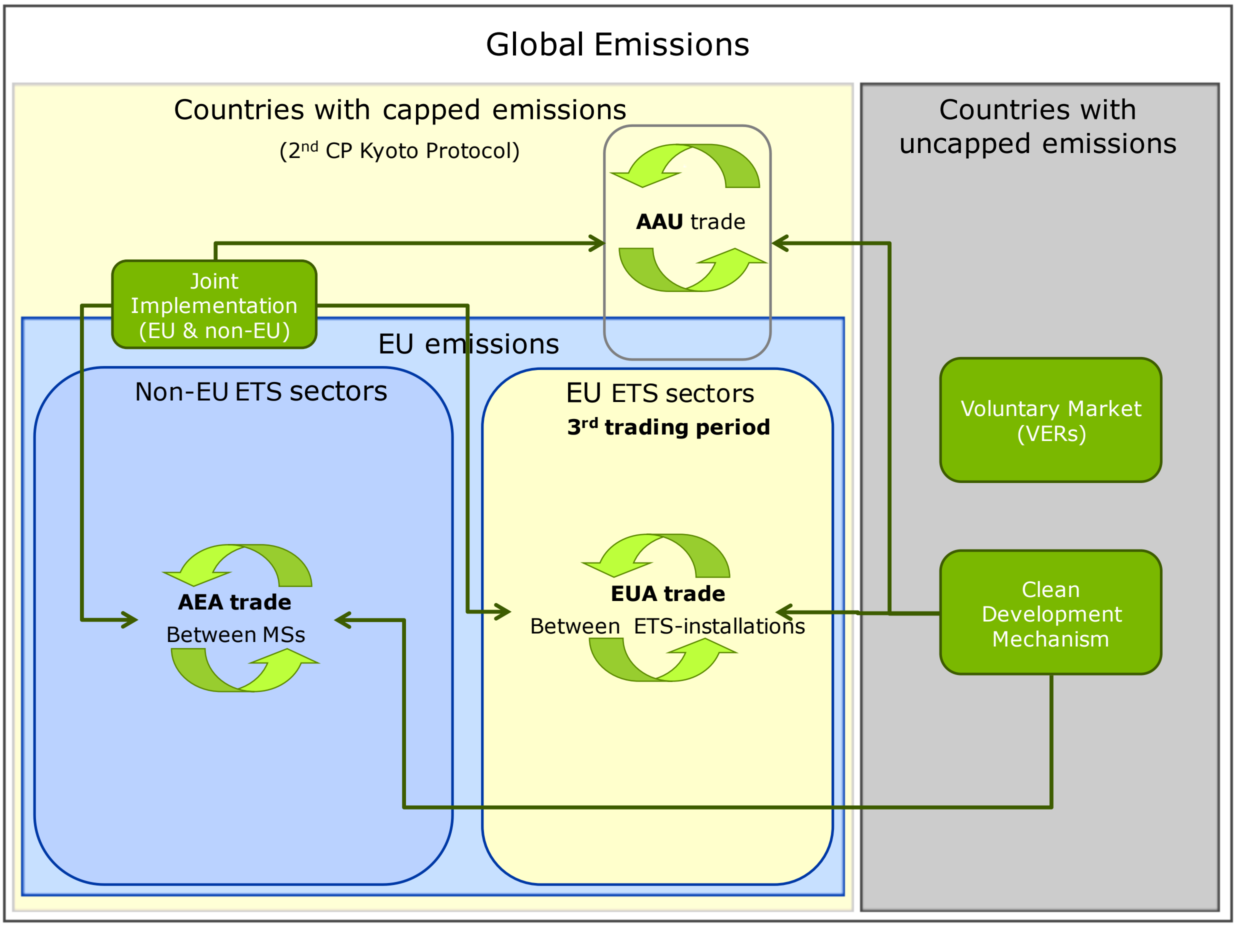

Figure 1: The global UNFCCC climate policy landscape, post-2012, assuming a 2nd Kyoto Protocol Commitment Period is agreed. Arrows indicate the possible flow of credits into different systems

Figure 1 demonstrates what the global policy landscape would look like should an agreement on a second Kyoto commitment period be reached. In short, the situation would work along the same lines as the current commitment period (CP1). The diagram shows that countries with capped emissions are assigned AAUs, which they can trade between themselves depending on whether they have a shortage or surplus of allowances. Within the EU, the total EU cap on emissions is then split into two smaller 'sub-caps'; one for sectors included in the EU Emissions Trading Scheme (EU ETS) and one for all other sectors (known as non-ETS sectors). Allowances tied to emissions in sectors covered by the EU ETS are known as EU Allowances (EUAs). Allowances tied to emissions in non-ETS sectors are known as Annual Emissions Allocations (AEAs). The arrows in the diagram represent the possible use of CDM or JI credits for compliance with Kyoto, EU ETS or non-ETS reduction targets. For example, CERs can be used for compliance by participants in the EU ETS, and by governments to meet emissions reduction targets established for their non-ETS emissions, as well as to meet their overall Kyoto emissions reduction targets.

All allowances or credits that originate in capped countries i.e. ERUs, AEAs or EUAs are, under the Kyoto Protocol, linked or 'backed' by AAUs. When any of these units are transferred, retired or cancelled, a corresponding AAU undergoes the same fate in order to avoid double counting.
The concepts of AEA and EUA trade will be further explained in paragraph 2.2.

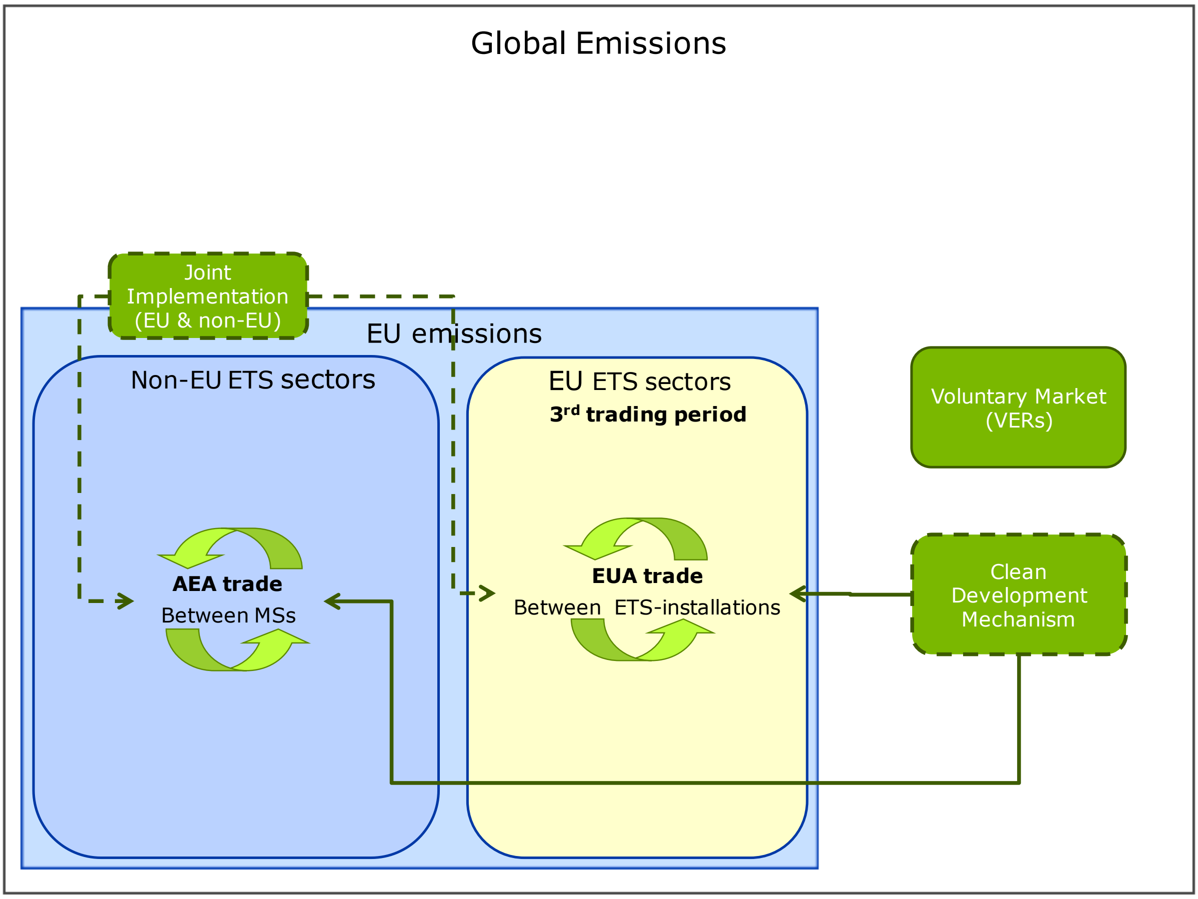

Figure 2: The global UNFCCC climate policy landscape, post-2012, assuming no 2nd global, legally binding agreement (like Kyoto) is reached. The future of the JI mechanism is highly uncertain and therefore represented with dotted lines

Figure 2 shows what the global policy landscape could look like if no consensus on a 2nd Kyoto commitment period can be reached. The EU has committed to reducing emissions beyond 2012, regardless of the outcome of UNFCCC negotiations, and therefore a cap on EU ETS and non-ETS emissions will remain to at least 2020.

Without a 2nd commitment period under the Kyoto Protocol there will no longer be a legal framework for the AAU trading mechanism. Other countries outside the EU may also set up national or bilateral schemes to reduce emissions, but the globally recognised UN-approved AAUs will cease to exist. This may have knock-on implications for other mechanisms.
Most notably, it puts the future of the JI framework in a highly uncertain situation. This is because JI credits and AAUs are linked to each other, and in the absence of AAUs it is highly uncertain whether new JI credits will be able to be issued[3]. CDM credits are not linked to AAUs, and so the mechanism

[3] The JI Supervisory Committee proposed two interim solutions on 22 September 2011: "1) use AAUs from the first commitment period for the issuance of JI credits for reductions under Track 2 after 2012, 2) adopt modalities to continue issuance of JI credits

will continue regardless of discussions around a Kyoto CP2. The EU commitment to the EU ETS and the eligibility of CERs within the EU-ETS ensures that demand for CERs will continue until at least 2020. These units all contribute to compliance with international emissions reduction targets.

Voluntary markets
A separate market called the voluntary market also exists. This market is comprised of credits that cannot be used for compliance with targets or obligations, but for philanthropic or marketing purposes. For example, a company that wants to brand itself as 'carbon neutral' can buy voluntary credits (known as Verified Emissions Reductions, or VERs), to offset the company's emissions. As these credits are not used for compliance, voluntary market accrediting standards are characterised by a greater degree of innovation and a broader range of eligible project types. VERs generally sell at a slight discount to compliance credits as they do not require the same level of robustness in monitoring, reporting and verification practices seen in compliance standards. The two most widely known voluntary standards are the Gold Standard and the Verified Carbon Standard (VCS). Both of these standards allow projects to take place in Annex 1 countries, although the Gold Standard requires that an amount of AAUs equivalent to those generated by a project is cancelled. Note that the Gold Standard administers both CDM projects and voluntary market projects. Only voluntary Gold Standard projects may take place in Annex 1 countries – CDM Gold Standard is not eligible[4]. The voluntary market can be considered as a well-established and relatively stable market. In 2010 131 $MtCO_2e$ were traded on the global voluntary market, with a value of USD$424 million. The benchmark voluntary market standards discussed in this report have been in operation for several years. The VCS was established in 2005, while the Gold Standard was established by WWF in 2003. Throughout this period voluntary market prices have been stable in comparison to compliance market prices[5].

2.2 The situation in Europe

The EU27 has committed itself to an overall reduction of 20% in 2020 compared to 1990 levels, although each country has an individual target. Some countries must reduce emissions, while others have agreed to limit emissions growth. All of these targets combined average out at the EU overall target of -20%.
The total cap on emissions within Europe has been split into two smaller 'sub-caps', for ETS and non-ETS emissions. These caps will continue regardless of whether a second Kyoto Protocol is agreed.

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and deduct these from future emission targets adopted by countries." Taken from: http://www.jiactiongroup.com/NewsArchives.htm (accessed 12 July 2012). There is currently no confirmation whether this proposal is approved and what the "adoption of modalities" in practice will mean.
[4] http://v-c-s.org/sites/v-c-s.org/files/VCS%20Policy%20Brief,%20Double%20Counting.pdf (accessed August 31, 2012); http://www.cdmgoldstandard.org/wp-content/uploads/2012/06/GSv2.2_Requirements.pdf (see Ch.2, section IIIb.3) (accessed August 31, 2012)
[5] State of the Voluntary Carbon Markets 2011, Ecosystem Marketplace. http://www.ecosystemmarketplace.com/pages/dynamic/resources.library.page.php?page_id=8351&section=our_publications&eod=1

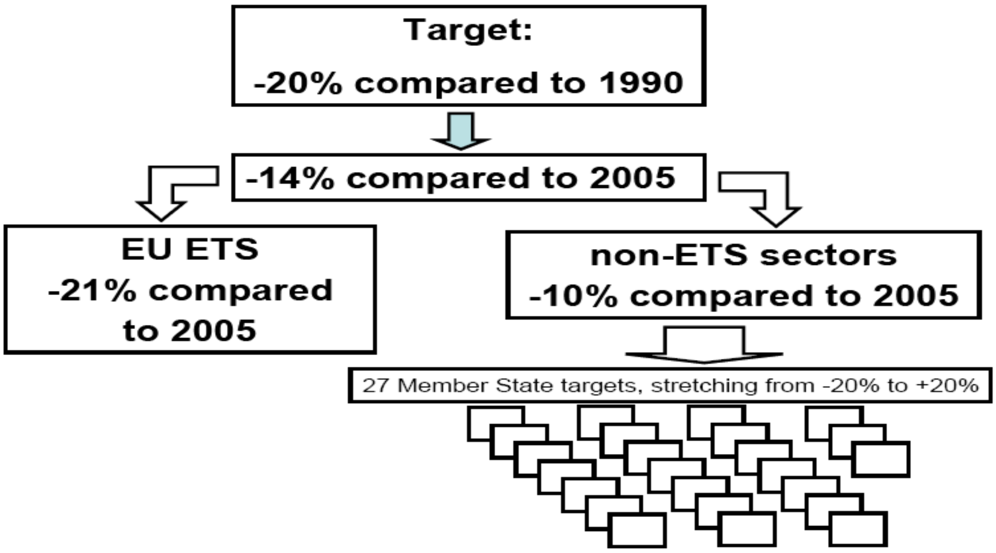

Figure 3: EU27 target for 2020 is split between an ETS target and a target for non-ETS sectors which is Member State specific

EU Emissions Trading Scheme

Since 2005 there is a cap on emissions from the power sector and heavy industry, via the EU Emissions Trading Scheme (EU ETS). Within the EU ETS participating installations are allocated emissions allowances (called EUAs) each equivalent to 1 tonne of CO_2. At the end of each year installations must surrender allowances equivalent to their overall emissions for that year. If a company is allocated more allowances than it needs, or has reduced emissions so that it has a surplus, these extra allowances can be sold to companies that have a shortage of allowances. EUAs can be traded between installations in the same country, or in different EU Member States. The scheme is overseen by the European Commission, with support from Member State governments.

Although the predominant unit within the EU ETS is the EUA, credits from the CDM or JI can also be bought by participants and used to count towards their targets. However, there is a limit on the number of credits that can be used within the system. This limit varies from MS to MS, but on average equates to approximately 11% of an installation's total emissions.

EU emissions targets for non-ETS sectors

Sectors not included in the EU ETS (e.g. agriculture, transport, waste) are capped under the Kyoto CP 1 at the national level via the AAU distribution over Member States. From 2013 onwards, the European Commission will allocate Member States with a new type of allowance known as an Annual Emission Allocation (or AEA), in line with national caps on non-ETS emissions. The total amount of AEAs distributed among all Member States is equivalent to the total cap on non-ETS emissions, as specified in the Effort Sharing Decision[6], and this will exist either with or without the existence of underlying AAUs. The AEA allowances can be traded between governments (over-the-counter) depending on which countries have a surplus amount of AEAs, and which countries have a shortage. Countries will be required to surrender an equivalent number of AEAs to match their emissions in these sectors[7]. As an additional flexibility measure governments may also purchase CERs to help them meet their target, from the CDM mechanism described above.

The two schemes (EU ETS and non-ETS) are separate and distinct from one another, and allowances from one scheme cannot be used for compliance in the other. EUA and AEA trades are explained in further detail in Figure 4 below.

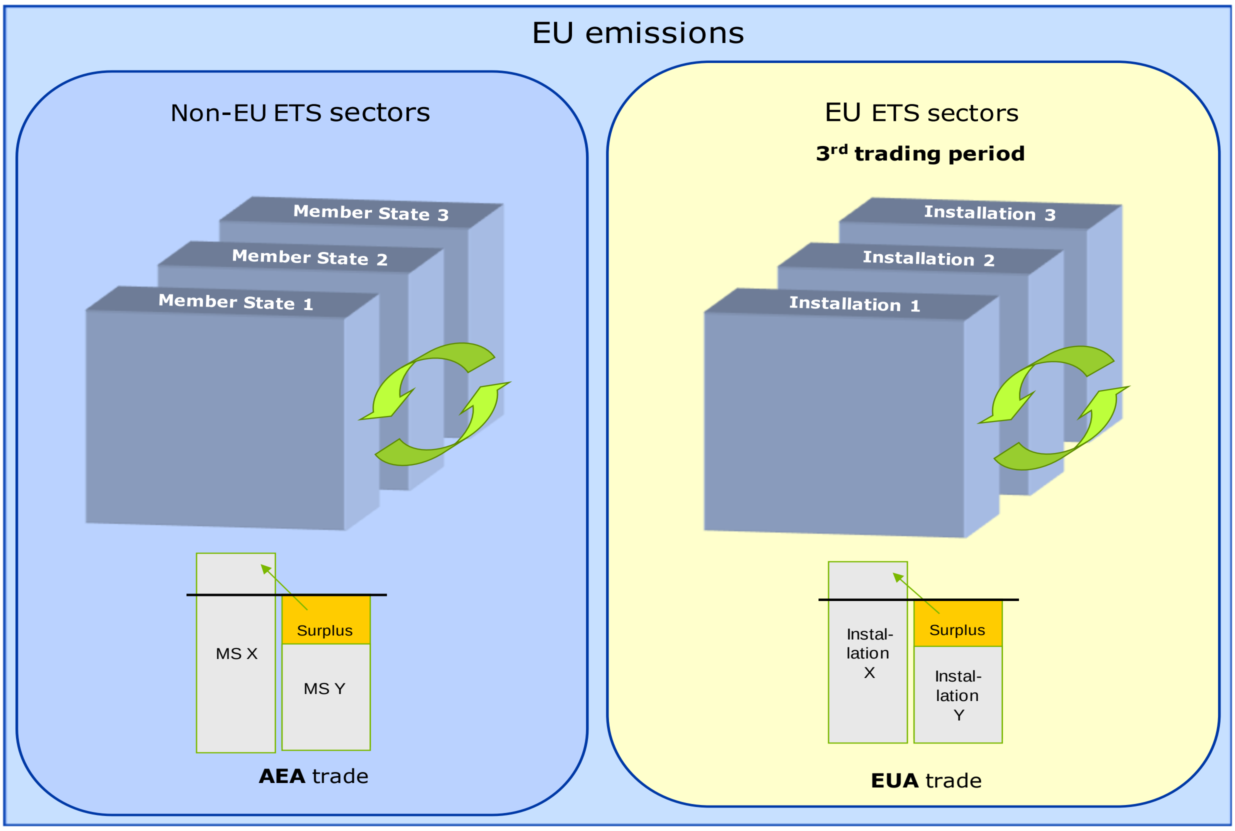

Figure 4: EU carbon market landscape post-2012 (assuming no further action by Member States and no successor to Kyoto Protocol after 2012)

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[6] Decision No 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32009D0406:EN:NOT

[7] The practical details of the compliance step are not publicly known yet, e.g. whether it will be annual or not, whether it will entail real surrendering of AEAs to a public body or cancelling of AEAs on the national registry, etc.

Similarity between AAUs and AEAs can sometimes lead to confusion in distinguishing their specific roles and remits. The key difference is that AAUs relate to a cap on a country's total national emissions, while AEAs relate to a cap on an EU Member State's non-ETS emissions only. Other similarities and differences between AAUs and AEAs are listed below.

Similarities and differences between AEA and AAU related obligations
The post-2012 obligations for the Netherlands related to the emissions in the non-ETS sectors are in principle similar to the pre-2012 Kyoto obligations:

- An overall target on emissions has to be met in a certain target year.
- The target has to be met with internationally tradable units (AAUs under Kyoto, AEAs under the EC).
- Both allowance types (AEAs and AAUs) can be traded at the governmental level.
- To comply with the targets the amount of assigned allowances can be supplemented by an amount of CERs and ERUs.

There are also some differences related to its features:

- AAUs are tradable among all 'Annex 1' countries (the 37 countries whose emissions are capped under the Kyoto Protocol), while AEAs are only tradable between EU Member States.
- Under Kyoto the cap was static, while the non-ETS emissions target for the Netherlands is decreasing each year;.
- There are some specific limitations to AEA trades between government in relation to timing and quantity.

2.3 The default post-2012 situation at national level

While Figure 4 shows the situation at the EU level, Figure 5 and Figure 6 dive down into what occurs at the national level.

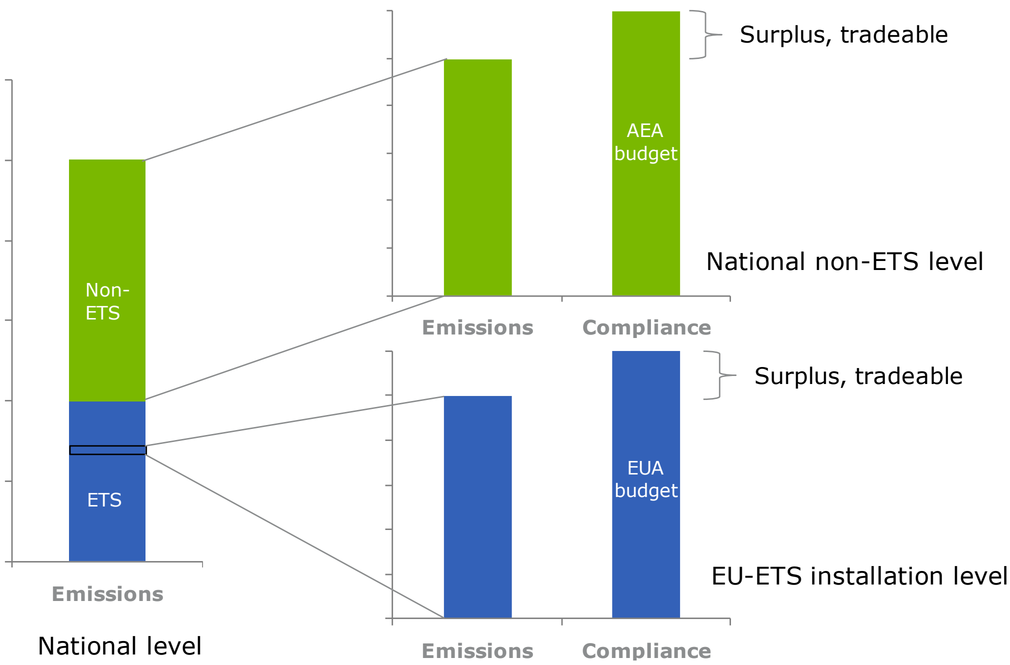

Figure 5: The situation at Member State level, showing a surplus in allowances

The bar on the left shows the composition of emissions within an EU Member State. Emissions are generated either by sectors included in the EU ETS (blue section) or sectors not included (green section). Currently, allowances connected to emission reductions achieved in either the blue or green sections are not interchangeable. In other words, allowances from non-ETS sectors cannot be used for compliance in the EU ETS or vice versa.

Within the EU ETS, installations are provided with allowances equivalent to the free allocation rules at EU level. Installations can trade these allowances based on who has a surplus or deficit of allowances. In Figure 5 above the allocation of allowances for both ETS sectors and non-ETS sectors are represented by the 'Compliance' columns on the right hand side. In the EU-ETS installation example given above, in the bottom right of the figure, the installation has more allowances than it needs. It can therefore sell this surplus into the market, and benefit financially.

The same situation is occurring at the national non-ETS level, shown in the bar chart in the top right of the Figure. National emission reduction projects in the non-ETS sectors can be used to achieve compliance with the cap on national non-ETS emissions. The more reduction activities undertaken, the lower national non-ETS emissions will be. Such activity can help to reduce a shortfall in AEAs, or can even generate a surplus of AEAs that can be traded internationally by governments throughout Europe.

The bar chart in the top right of the diagram provides an example of a country that has achieved a surplus of AEAs by undertaking emission reduction activities. A Member State can implement these projects itself (government-led), or can award private sector actors to reduce emissions on its behalf. The Member State has more AEAs than it needs to comply with its obligations, and can therefore sell this surplus to Member States that have a deficit of allowances. Member States may also end up with a surplus of AEAs without taking any direct action, for example, if production drops, or if a sector autonomously becomes more efficient (perhaps because of new technologies entering the market). Again, this surplus is tradable to other EU Member States.

Figure 6 demonstrates the options available to a Member State or EU ETS installation if it has a shortage of allowances. As well as purchasing additional allowances, the government or installation can also use (to a limited extent) credits to help them meet their targets. These credits can come from either the CDM or JI mechanisms described above.

In Figure 6 in the bar chart on the bottom right, we see the example of an EU ETS installation that emits more than its annual allocation of allowances. In order to comply with its EU ETS obligations, it therefore buys allowances (EUAs) from another installation (green section), and also purchases carbon credits from the CDM/JI (grey section) in order to meet its targets.

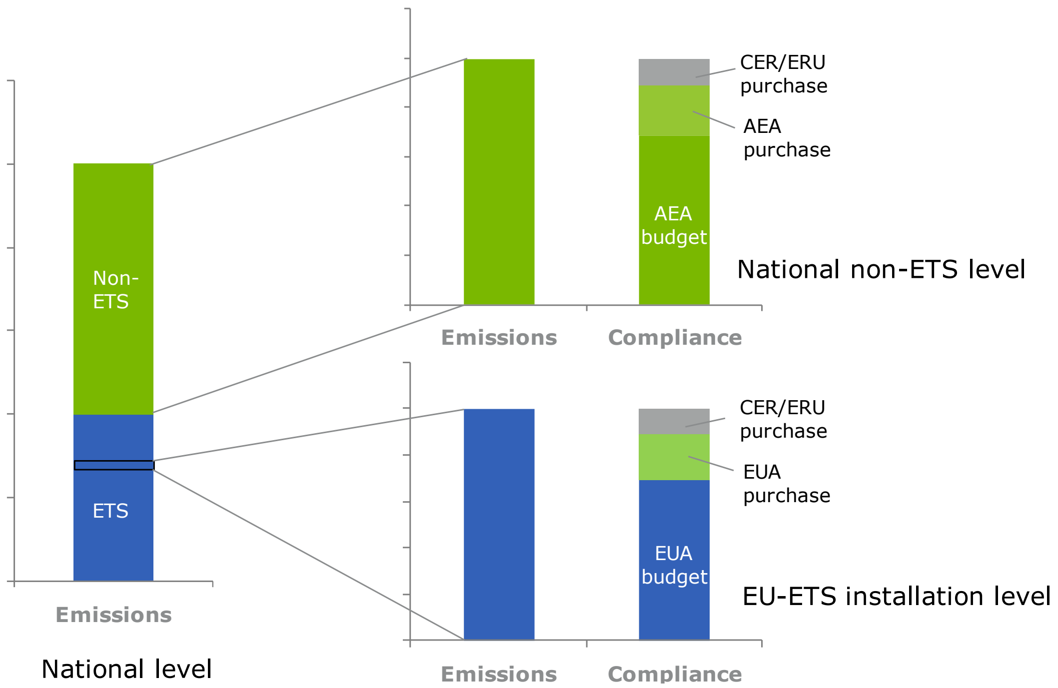

Figure 6: The situation at Member State level, showing a shortage of allowances

Within the non-ETS sectors, seen in the top right of the Figure, a government can also purchase AEA allowances from EU countries with a surplus, or can also purchase external UN credits (CERs or ERUs) to meet its compliance obligations[8]. Note that ERUs are included in the diagram, even though it is assumed that the JI mechanism will cease to exist (see paragraph 2.1), as existing ERUs in the marketplace will still be able to be used for compliance in the EU ETS.

2.4 What defines domestic offsetting?

With such a complex policy landscape the role and function of domestic offsetting can be obscured. The definition of domestic offsetting can be highly nuanced, and dependent on policy decisions at different levels of governance.

In its strictest sense domestic offsetting is the purchase of emissions reductions from one sector by another industry sector within the same country or by the government in the same country. Buyers may use these credits to meet national emissions reduction obligations placed on them by their government or the government can buy these credits to meet the national obligations. Domestic offsetting is therefore different from the CDM and JI mechanisms described above where the investor and host of the project are located in different countries.

Domestic offsetting is also used to describe schemes that are more international in scope, not sticking as strictly to the definition given above. At its most broad, domestic offsetting can be described as the generation of emissions reduction credits in sectors not covered by an emissions trading scheme, that can be purchased to offset emissions by other entities, within the host country or not.

Article 24a of the EU-ETS Directive implies a domestic offsetting scheme where domestic offset credits are eligible throughout all of the EU, and for compliance with both non-ETS and ETS targets. However, it does not specify whether the mechanism that generates these domestic offset credits would be national, or centralised for the entire EU.

The remainder of this report provides some examples of existing domestic offset schemes that fall within both the strict and broad definitions above. The report explores the advantages and disadvantages of a range of approaches.

In the next chapter, we explore existing domestic offsetting systems in Europe and elsewhere around the world. In Europe, domestic offsetting is implemented via a JI-like mechanism. Domestic reductions generated using a JI-like mechanism are not strict JI, as that requires a bilateral arrangement between two countries: the host country and the buyer country.

[8] In regards to the non-ETS cap on emissions Member States are allowed to use CDM or JI credits equivalent to 3% of that Member State's emissions in 2005. As in the EU ETS, CDM credits generated on or after 1st January 2013 must come from Least Developed Countries, and should abide with the restrictions in eligible project types set out in the revised EU Emissions Trading Directive http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0063:0087:en:PDF

However, a process known as domestic JI has developed where projects are essentially developed unilaterally by the host country. Using this approach, a country will act as a buyer country for the purposes of meeting the bureaucratic requirements, but will ultimately not buy the credits generated by the project. Instead, the host country keeps these credits to count them against their emissions inventory, therein creating a net reduction of emissions.

The JI framework is not the only way to create domestic offset credits, but many governments have chosen to do so as it constitutes a robust, established framework that the government can use rather than carry the cost of implementing a new framework. Some countries, such as Denmark, have adopted the features of this framework without actually implementing it. This allows governments to adjust the framework to fit national priorities, such as targeting particular sectors or reducing costs.

3 Domestic offsetting in other countries

What are the lessons learned in designing and implementing domestic offsetting in other countries?

Several other countries have already established domestic offsetting schemes, and exploration of the experiences of these countries can provide some valuable insights into what factors are key to a successful domestic offsetting scheme.

Table 1 below provides an overview of existing domestic offset schemes around the world. The table provides a comparison of the different objectives and structure of these schemes. The structure of a domestic offset scheme can be designed to fit different national contexts and policy priorities. The table provides a description of the main criteria that need to be considered when designing a domestic offset scheme. These criteria include scope, integration into existing climate structures/legislation, the environmental integrity of the scheme and its interaction with other (international) market-based climate mechanisms.

General and country-specific lessons learned can be found below the table.

Table 1: Valuable insights from DO in other countries

	New Zealand ETS Permanent Forest Sink Initiative (PFSI)	New Zealand Projects to Reduce Emissions	Australia NSW GGAS	Australia Carbon Farming Initiative	California ETS Compliance Offset Protocol	France Domestic JI	Germany Domestic JI	Denmark Domestic Climate Pilot	Swiss CO2 Law
Objectives	Create a financial incentive for private owners to preserve NZ forest by compensating for carbon sequestered	Incentivise domestic emissions reductions	To reduce GHG emissions associated with the production and use of electricity; and to develop and encourage activities to offset the production of GHG emissions.	Incentivise reductions in the Australian agricultural and forestry sector	Provide price flexibility to participants in the California cap & trade scheme	Incentivise domestic emissions reductions	Incentivise domestic emissions reductions	To help boost domestic climate initiatives reducing Denmark's non-ETS footprint	To reduce emissions from the use of fossil fuels (heating and motor fuels), and to increase the use of renewable energy
Type of scheme	Project-based scheme where forest owners sign legally binding covenant to not deforest in order to receive carbon income	Tendered baseline and credit project approach	Mandatory baseline and credit scheme for NSW electricity producers.	Voluntary offset scheme	Regional ETS with domestic offset eligibility	Domestic (unilateral) JI framework	Domestic (unilateral) JI framework	Based on JI framework	Mandatory offsetting scheme. Fossil-fuelled plants generating power or heat pay to compensate 100% of their CO2 emissions. 70% from national projects and 30% from international projects.
Start date	2007	2003	2003	2011	ETS to start in 2013, but offsets can be used in the voluntary market since 2001	2007	2002	2011 (pilot phase)	2000
Legislation / use of existing structures	Covered under Part IIIB of the Forests Act 2006. Overseen by Ministry of Agriculture and Forestry	Administered by NZ Ministry of Environment	Legal basis: amendments to the Electricity Supply Act 1995 (the Act) and the Electricity Supply (General) Regulation 2001 (the Regulation). Overseen by Independent Pricing and Regulatory Tribunal	Overseen by Government's Clean Energy Regulator. Covered by Carbon Farming Initiative Act 2011	Credits generated under existing US voluntary standard Climate Action Reserve. Offset Protocol included in subarticle 13 of the cap & trade regulation.	System implemented through Caisse des Dépots, which issued several tenders to buy ERUs at an agreed price.	The German Emission Trading Authority (DEHSt) is responsible for the actual approval and administration for projects.	Administered by Danish Energy Agency. Scheme uses Track 1 JI infrastructure with some adaptations.	Emission reductions are calculated using CDM small scale methodologies. The methodologies are adapted and standardised by the authorities based on project experiences made, e.g. with regards to emission factors.
Name of credit	AAU (Assigned Amount Unit)	AAU (Assigned Amount Unit) / ERU (Emissions Reduction Unit)	NGAC (NSW GHG Abatement Certificate)	(ACCUs) Australian Carbon Credit Units	CRTs (Climate Reserve Tonnes)	ERUs	ERUs	No credits issued.Developer receives the financial equivalent for ERU credits from government.	Domestic certificates are issued for domestic reductions. These are not convertible to Kyoto certificates. JI or CDM credits can also be used (for the 30%)
Who pays?	Forest owners pay to establish/maintain forest	Project developers, who recoup investment in the market.	Project developers.	Transaction costs covered by developers. The government has launched AUS$13 million fund to help developers create successful project methodologies.	Project developers, who recoup investment in the market.	Project developers, who recoup investment in the Kyoto market.	Project developers, who recoup investment in the Kyoto market.	Government has committed DKK 8 million to buy emissions reductions created in the 1st pilot (equivalent to 65,000tCO2). Transaction costs covered by developer.	Scheme participants who invest in reduction projects

Table 2 (continued): Valuable insights from DO in other countries

	New Zealand ETS Permanent Forest Sink Initiative (PFSI)	New Zealand Projects to Reduce Emissions	Australia NSW GGAS	Australia Carbon Farming Initiative	California ETS Compliance Offset Protocol	France Domestic JI	Germany Domestic JI	Denmark Domestic Climate Pilot	Swiss CO2 Law
Reductions achieved	Information not available	34 registered projects with total abatement potential of 34MtCO2	Over 96 million abatement certificates created since the start of the scheme	Information not available	The Climate Action Reserve has generated more than 26 million credits since it's introduction.	17 projects have been registered of which the absolute majority addresses emission reductions of N_2O. Combined, the projects have an emission reduction potential of more than 3.5 $MtCO_2e$/yr.	24 domestic JI projects are registered in Germany and 2 further projects are officially under validation. Combined the projects have an emissions reduction potential of more than 5 MtCO2e/yr.	65,000tCO2 in the first pilot, and 35,000tCO2 expected in the second pilot	Information not available
Credit price	Information not available	Information not available	Averaged approx AUS$4.70, although this descended to nearly zero in the last year of the scheme (the scheme ended on 1 July 2012)	In the Carbon Farming Initiative credits currently have a fixed price at AUS$23, and will move to a market price in 2015 (although with a floor price of $15).	USD$8 - 10	Information not available	Information not available	Approximately €16 (120DKK) per ton	Information not available
Quality criteria	Eligible forests must be "direct human induced .... through planting, seeding and/or the human-induced promotion of natural seed sources".	Project must reduce at least 10,000tCO2 in Kyoto CP1. Projects must be 'additional' (beyond business as usual)	Performance standard benchmarks	Additionality requirements (not common practice or required by law). Reductions must be permanent	Project-specific additionality criteria are set by the standard	Additionality and baseline criteria in line with Joint Implementation framework	Additionality and baseline criteria in line with Joint Implementation framework	Additionality and baseline criteria in line with Joint Implementation framework	At least 70% of emissions reduction activity must take place domestically. As these reductions will not be traded internationally they create a NME.
Sectors covered	Afforestation and reforestation activities	All (except forestry, covered by PFSI scheme)	Electricity retailers. (Optionally) large companies with electricity loads greater than 100GWh	Agricultural methane/nitrous oxide avoidance; Landfill legacy avoidance; Carbon sequestration projects	ETS covers California's heaviest industrial emitters. Eligible offset activities include forestry, agriculture, landfill, coal mine methane, nitric acid production, organic waste composting/digestion	Any sector not included in EU ETS, provided an approved applicable JI methodology exists	Any sector not included in EU ETS, provided an approved applicable JI methodology exists	Non-EU ETS sectors	Fossil fueled thermal power plants
Linkage to other schemes	AAUs can be used in the NZ ETS or by Annex B countries	ERUs internationally tradeable (EU ETS, Annex B countries, NZ ETS)	Credits cannot currently be used for compliance in any other scheme	Credits can be used for compliance in upcoming Australian ETS (starting 2015)	CAR offsets can also be purchased on the voluntary market, but California ETS will form bulk of demand	ERUs internationally tradeable (EU ETS, Annex B countries, NZ ETS)		Currently none.	30% of compensation can take place outside Switzerland. Swiss reductions are not used in any other scheme.
Future prospects	Ongoing.	At the moment the NZ government does not intend to take any further tenders	The scheme will close on 1 July 2012, and will be superceded by the Australian carbon tax	Credits can be used for compliance in upcoming Australian ETS (starting 2015)	Ongoing.	There is some uncertainty over the long term future for JI, which is tied to the possible renewal of the Kyoto Protocol. Discussion is ongoing at UNFCCC levl.		Expected to become a fully fledged scheme, following success of pilots	The government thinks current methodologies lead to high transaction costs, reducing the scope for offsetting projects. Options for simplification are currently under discussion. Such options might include discounts as a means to ensure a conservative assessment.

3.1 Valuable insights from domestic offsetting in other countries

3.1.1 Specific observations

Some valuable insight can be gained from specific scheme experiences. Although the experiences of other EU countries are arguably most interesting, the lessons learned in other countries are also useful as these countries also share similar levels of economic development.

New Zealand

- NZ PRE and PFSI schemes have enabled government administrators to familiarize themselves with carbon market instruments while reducing domestic emissions.
- Administrators were able to establish processes for linkage between domestic activities and international carbon markets.
- It can be assumed that due to the small population size linkage to international carbon markets is important for a small country like New Zealand to ensure liquidity and demand for credits. This is likely the reason that awarded credits through the PRE or PFSI can be exchanged for internationally recognised credits.
- Experiences helped to feed in to New Zealand economy-wide Emissions Trading Scheme (NZ ETS).

Australia

- Carbon Farming Initiative designed to incentivize reductions and research into new agricultural abatement technologies, which could lead to potential exportable intellectual property.
- Scheme acknowledges the difficulty in establishing robust project methodologies for the sector, and funding is provided to overcome this obstacle.
- Concrete lessons learned still to be determined, as scheme still not fully established.

Denmark

- The Danish Domestic Climate Programme has undertaken two pilots. The second pilot is ongoing, and the Danish Environment Agency is in the process of evaluating and selecting the successful project.
- This scheme constitutes a 'government buyer' scheme, as all reductions are purchased to count against the national GHG inventory[9].
- One of the aims of the pilot was also to simplify documentation requirements that increase transaction costs. Accordingly, The Danish Energy Agency has developed PDD templates that are streamlined to help project developers to keep administration costs to a minimum. Project verification done by Danish Centre for Environment & Energy, who also maintain Danish

[9] For an explanation of differences between the government buyer approach and subsidies, please see the 'general lessons learnt'. The government buyer approach is further detailed in Chapter 5.

national GHG inventory. This way data on emission reductions from the projects can easily be aligned with inventory data.

- Chosen project in 1st pilot was treatment of wastewater sludge using Oxidizing Hydrolytic Destruction. This was chosen as this is the first time this technology has been implemented in Denmark, and may encourage further implementation outside of the program.
- A June 2012 presentation[10] by the Danish Environment Agency details Denmark's experiences of the scheme, and provides some lessons learnt. Barriers to successful engagement with the scheme included lack of capacity, low carbon awareness, risk adverse local politicians. The second tender round focused on projects at the municipal level, and the scale of potential reductions was found to be relatively low.
- Ideas to address these barriers include an increased scale of reductions through a programmatic approach, and the provision of support via a coordinating entity to provide more reliable data (for use in project analysis and monitoring) and to promote awareness.

France

- Methodologies used in French domestic JI projects must be approved by the government.
- Problems encountered included:
    - Lengthy approval procedures;
    - Need for invisible partner country (JI requires two parties);
    - Expensive verification fees.
- These problems were addressed in part by modifying Track 1 JI process via new national laws[11]. This law allows the use of methodologies approved by the French government and not necessarily by the JI administrative body. This allows the government greater control over the rate of evaluation of proposed new methodologies.

Germany

- Germany is a pioneer of Programme of Activities (PoA) JI projects, having done more than any other country.
- Beside three coal-mine-methane projects, 8 N_2O reduction projects and one project reducing PFC emissions, mainly small scale energy efficiency projects are using the "Programme of Activities" (PoA) approach are registered.

California

- California ETS administrators have designed Compliance Offset Protocol to provide some price flexibility to participants in the California ETS.
- Currently, legislation states that should offset credits be discovered to come from project subsequently found to be non-additional, the buyers of the credits will be liable to compensate

[10] http://www.ens.dk/da-DK/KlimaOgCO2/NationaleKlimaprojekter/workshop/Documents/Danish%20Energy%20Agency%20%28Bo%20Riisgaard%20Pedersen%29.pdf
[11] http://www.developpement-durable.gouv.fr/IMG/pdf/joe_20070307_0056_0061-2.pdf

for the false reductions. This has led to significant protests among potential project developers (could impact demand) and buyers, and is currently a point of dispute.

- Concrete lessons learned will be determined once the ETS has been established, but the scheme benefits from using an offset standard (CCAR, the California Climate Action Reserve) with well-established processes and protocols to enable delivery of robust projects.

Switzerland

- Initially a voluntary approach was taken, but this did not meet the required levels of effort, and mandatory measures were introduced instead.
- The Federal Office for Environment considers that the methodologies currently used lead to high transaction costs, reducing the scope for offsetting projects. Therefore options for simplification are currently under discussion.

Ireland, Finland and Czech Republic

- Ireland and Finland have both undertaken scoping studies to assess the potential for domestic offsetting.
- Both studies looked at the different options for implementing a domestic offset scheme, looking at barriers and opportunities, and different possible design structures.
- Ireland's motivation is to develop a tool to help to reduce Ireland's non-ETS emissions, as the country is currently on track to fall short of its EU non-ETS reduction target.
- Currently no domestic offsetting scheme has been established in either Ireland or Finland.

The Czech Republic has implemented a number of domestic JI projects. The Czech Republic has developed 58 domestic JI projects. However, only one of these is an N_2O project, and all others have been small-scale "bundled" activities in landfill gas and biomass energy sectors.

3.2 Lessons learned from offset schemes in other countries

From these observations we can draw a number of lessons about the potential to implement a domestic offsetting programme, and can identify some key success factors that can ensure cost effective, net non-ETS emissions reductions.

1. **There is experience of a wide variety of project types.**
   Schemes have pursued abatement opportunities relating to biomass, waste treatment and anaerobic digestion. Different schemes have targeted different project opportunities. For example, the 2nd Danish pilot has targeted municipal projects while the Czech Republic has focused almost entirely on smaller-scale bundled projects in the landfill gas and biomass sectors.
   - Focus areas for Domestic Offset schemes should bear in mind the future eligibility of gases and/or sectors into the EU ETS (e.g. following the example of N_2O projects no longer being eligible).

In order to prioritize activity in particular sectors there are incentive measures that can be taken. For example, only credits from certain sectors could be eligible for international trade (e.g. forestry in the NZ ETS), or only one sector may be eligible to host projects (e.g. agriculture in the Australian CFI).

2. Domestic JI projects have delivered reductions, but the scope for future domestic JI projects is uncertain.

- Annex 1 participants in the Kyoto Protocol currently have the option to use an established framework to guide emissions reductions (JI). The countries that began project-based domestic offsetting the earliest are the countries that have made the link to this mechanism (France, Germany, New Zealand, although in the case of New Zealand JI processes are not used, but credits can be issued as ERUs). Countries that initiated domestic offset activity at a later date have used different approaches. All countries that have adopted domestic JI have seen real quantifiable emissions reductions.
- However, with no agreement at the UNFCCC level about its future, the fate of the JI mechanism, and its domestic JI counterparts, remains uncertain.
- Furthermore any possible expansion in the scope of the EU ETS would limit abatement potential via a domestic offset approach.

3. Non-JI project volumes are low.

Generally the project types undertaken in existing schemes are those with low reduction volumes, such as anaerobic digestion projects, or those in the waste sector. One exception to this trend is projects in the N_2O sector. Both France and Germany have undertaken substantial activity within this sector via their domestic JI programmes.

- The ambition for the volumes of reductions potentially achieved via a domestic offset scheme should be realistic (see also Chapter 4).
- It must be born in mind that N_2O projects will no longer be a possibility as they will be captured in Phase 3 of the EU ETS. Therefore domestic offsetting will only be a possibility for smaller scale projects, and the workload and costs for implementing such projects may impose serious barriers that should be addressed.

4. Transaction costs can be a real barrier to implementation.

- This barrier has been identified in the Swiss, Danish and French schemes.
- The Danish, German and Swiss schemes have worked or are working to streamline the project development process in order to reduce transaction costs. From this we can deduce that transaction costs are reducing the feasible abatement potential of a domestic offset scheme.
- For the Danish and Swiss schemes it is not yet possible to assess the effect of these streamlined approaches. The Danish scheme is still in a pilot phase, and the Swiss simplification of methodology is still under discussion.

  For other schemes, the German adoption of a programmatic approach helps to reduce transaction costs by reducing the amount of verification that must take place, via a sampling approach rather than verification of all individual emissions sources. It also streamlines the process of establishing an emissions baseline.

- It is important to note that a programmatic approach is not about reducing costs to developers, but about allowing potential emissions reductions to reach a threshold where the project activity would be viable.
- This approach could also be applied within the Netherlands, depending on the future of the mechanism. Some existing voluntary offset standards such as the Verified Carbon Standard (VCS) also allow programmatic approaches, and the Netherlands could therefore use one of these existing approaches to avoid the time and cost of developing its own programmatic mechanism.

5. Emissions reductions within agriculture are challenging due to the lack of eligible project methodologies, the cost of developing such methodologies, and the high marginal abatement costs within the sector.

- In the experiences of the Australian CFI scheme and the New Zealand ETS, the main obstacle was establishing acceptable methodologies with accurate and consistent measurement and verification of emissions reductions achieved. Project based agricultural emissions reductions are therefore an expensive option, not only because of the high marginal abatement cost of some of the measures implemented, but also because of the need to research and develop monitoring solutions.
- It can be expected that this challenge will also exist in the Netherlands. However, some limited project types seem interesting for further analysis for their potential under a domestic offset scheme, due to the existence of eligible baseline and project methodologies and relatively low abatement costs compared to other project types within the sector(e.g. soil type or manure management systems). It might be interesting to draw from lessons learned from Australia and New Zealand on overcoming the monitoring obstacles inherent in these project types.
- New Zealand postponed inclusion of agriculture into its ETS until 2015, which suggests that the development of suitable new methodologies to drive activity in this sector is expected to take several years.

4 Greenhouse gas reduction potentials in non-ETS sectors

How much greenhouse gas reduction potential is available in the non-ETS sectors in the Netherlands which can potentially be tapped cost-effectively by a domestic offsetting scheme?

4.1 Emissions in the non-ETS sectors

The non-ETS sectors are all sectors or sub-sectors that do not participate in the European Emissions Trading System (EU-ETS). Examples include buildings, transport (except aviation), agriculture, and small to medium scale industry. In general, the EU-ETS consists of fossil-fired power producers, refineries, the chemical industry, other heavy manufacturing industries, and aviation.

The total amount of GHG emissions in the Netherlands in 2010 was 210.4 $MtCO_2e$. Approximately 60% of this amount could be attributed to the non-ETS sectors, see Table 3.

Table 3: GHG emissions in the Netherlands, split in ETS and non-ETS amounts. Source: Emissieregistratie, Nederlandse Emissieautoriteit (2012)[12]

	2005	2006	2007	2008	2009	2010
Total ($MtCO_2e$)	211.0	207.0	205.5	204.6	198.9	210.4
ETS	80.3	76.7	79.8	83.5	81.0	84.4
non-ETS	130.6	130.3	125.7	121.1	117.9	126.0

In 2013, the scope of the EU-ETS will expand and the scope of the non-ETS sectors will shrink consequently. In a theoretical exercise, this effect has been applied retrospectively to 2005 - 2008 emissions by PBL recently and is shown in Table 4.

[12] Taken from: http://www.compendiumvoordeleefomgeving.nl/indicatoren/nl0165-Broeikasgasemissies-in-Nederland.html?i=5-20

Table 4: GHG emissions in non-ETS sectors, corrected for the scope of EU-ETS post-2012. Source: PBL (2011)[13]

	2005	2006	2007	2008
Energy & industry	10.5	10.5	10.7	10.7
Energy	7.1	7	7.2	7.4
Industry	3.5	3.5	3.5	3.3
Built environment	28.3	29.1	26	28.8
Agriculture and Horticulture	6.5	6	6.4	7.2
Traffic	38.8	39.6	38.9	39.7
Other greenhouse gases (1)	29.1	28.8	28.9	28.8
- from agriculture and horticulture	17.1	17.2	17.2	17.6
- from industry and other sectors	12.0	11,6	11.6	11.2
Total	**113.2**	**113.9**	**110.8**	**115.2**

From a post-2012 perspective, the emissions within the non-ETS sectors are significantly lower. It is this scope of emissions that is relevant for the Dutch government in view of the non-ETS target resulting from the EU Effort Sharing Decision. The non-ETS emissions target for the Netherlands is, according to a proposal from the European Commission and indicatively calculated by PBL: 119 $MtCO_2e$ in 2013 linearly declining to 105 $MtCO_2e$ in 2020[14]. According to the latest analyses from ECN/PBL this target is currently within range[15].

4.2 Data sources

The analysis in this chapter is based on potentials and costs from different measures as determined by ECN/PBL in their latest Optiedocument 2020 (updated 15 June 2011)[16]. This document and the related Factsheets and "Analyse tool" list all additional greenhouse gas reduction potentials from a wide range of measures with respect to a reference scenario of adopted policies in place by 2010[17]. The emission reductions calculated by ECN/PBL are indicative, technical potentials and refer to a maximum achievable annual reduction that may be achieved by 2020.

[13] PBL (2011) Emissions and targets of greenhouse gases not included in the Emission Trading System 2013-2020. Available at: http://www.pbl.nl/en/publications/2011/Emissions-and-targets-non-ets-2013-2020
[14] Ibid.
[15] http://www.rijksoverheid.nl/documenten-en-publicaties/brieven/2011/06/08/brief-pbl-inschatting-effecten-klimaatbeleid.html
[16] http://www.ecn.nl/units/ps/themes/dutch-energy-and-climate-policy/options/; see also: Analysetool ECN/PBL (15 June 2011); http://www.ecn.nl/docs/library/report/2011/e11023.pdf
[17] As reported in 'Referentieraming energie en emissie 2010-2020', ECN-C-10-004

Overlapping potential of reduction measures has been corrected by ECN/PBL. For instance, the reduction potential that can be realised by more efficient heating equipment will be lower when a building has been insulated thermally first. Therefore, it is assumed that the most economically attractive measures are implemented first. In addition, some measures may have different levels of implementation and therefore different variants are sometimes taken into account. For example, the application of thermal insulation in the existing building stock can refer to improved wall, floor or roof insulation, which usually has different reduction potentials and economic pay back times. Also the thickness of the applied insulation has impact on both potentials and pay back times. By defining different variants these differences can be taken into account to some extent.
Note that in practice the reduction potential and cost effectiveness of projects could differ from the technical measures defined by ECN/PBL. A project could for instance include a combination of cheap and expensive options, making the reduction potential larger, but decreasing the overall profitability. We think these differences on project level will not change the order of magnitude of the available reductions potential identified in this study.

4.3 Available non-ETS reduction potential

We have determined the cost-effective reduction potential available in the non-ETS sectors by applying several filters to the list provided by ECN/PBL, see Figure 7 for a schematic representation. In the multicriteria analysis (Chapter 6) the potential after filter 4 is taken as a starting point, followed by a more precise impact assessment aligned with the characteristics of the domestic offsetting design of interest.

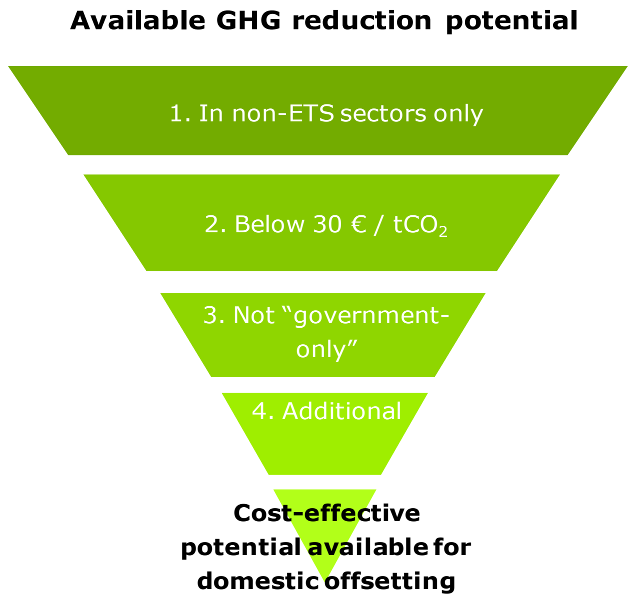

Figure 7: Filters applied to the available GHG reduction potential in The Netherlands. Each filter decreases the available reduction potential

Filter 1: Options in non-ETS sectors only
First, only options that apply to non-ETS sectors have been selected in order to safeguard the principle of "no double-counting". Projects related to renewable electricity generation are for example filtered out: fossil-fired electricity production is covered by the EU-ETS and renewable production of electricity may therefore result in less ETS emissions.
In the source data the relevant sector and the ETS/non-ETS status was indicated for each reduction option, making the filter straightforward to apply. Three options for industry (biomass-fired boilers, bio-oil-fired CHPs, and digestion of bio based waste streams in the food industry) are relevant for both ETS and non-ETS industries. The non-ETS part of these specific options were considered significantly smaller than the ETS-part of the potentials, therefore these options, accounting for a potential of 2.9 $MtCO_2$, have been excluded from the analysis.

After this first filter a list with 62 options was available, with a total technical reduction potential of around 24 $MtCO_2e$[18]. Some options appear in the list several times, but with different (additional) levels of implementation.

Filter 2: Maximum cost-effectiveness of € 30/tCO_2
The second filter is the cost-effectiveness of the reduction measures.

In this analysis a maximum CO_2-price stimulus of € 30/tCO_2 is assumed[19]. This means that all reduction measures with a cost-effectiveness beyond € 30/tCO_2 are considered as too expensive to be incentivised by a CO_2-price alone. Nevertheless, domestic offsetting could make "expensive" options (from a CO_2 point of view) more attractive as well. Because other factors play a role as well in sustainable decision making (energy prices, fuel strategies, sense of "urgency", marketing, etc) it cannot be excluded that part of this expensive potential may also be used for domestic offsetting[20] but this has not been taken into account in this analysis.

Because domestic offsetting is a market-based mechanism, the cost-effectiveness from the end-users (and not the social or national) perspective is relevant. In most options, the end-users cost-effectiveness is much lower than the national cost-effectiveness. This can be explained by the relatively large part of energy taxes applicable to fuels in the non-ETS sectors, which make energy savings financially more attractive compared to the national perspective. For example, fuel savings in road transport lead to reduced expenses (fuel costs and taxes) for end users, while on the national level we will experience a loss of tax income.

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[18] This number corresponds roughly to the ~24 $MtCO_2e$ technical potential for the non-ETS sectors indicated in Fig 3.4 of 'Actualisatie Optiedocument 2010' (ECN-E—1-023).
[19] The maximum level chosen here fits with price developments over the past years and price forecasts up to 2020: the current CO_2-price in the EU-ETS fluctuates between € 6-8/tCO_2e (June 2012). The maximum price over the last three years has not exceeded € 20/tCO_2e The current CO_2-price forecast for 2013-2020 predicts a price not larger than € 20/tCO_2e (i.e. without intervention from the European Commission). See also Observation 2 for a sensitivity check of the maximum CO_2-price.
[20] In Germany, we are aware of domestic reduction projects which are not profitable, but which are carried out for marketing purposes.

After this filter, a list with 35 options remains available, with a total reduction potential of 12.2 $MtCO_2e$.

Filter 3: No options that are "government-only"
Several options are in the list that can be implemented by a government only, e.g. lowering the maximum speed limit on highways, applying a kerosene excise duty, or setting a price-per-kilometre for cars and vans. The reduction potentials of these options can never be reached by a private investor, because it is the government only that has the legal power to put these specific policies in place. Therefore these options have to be taken out. Interestingly, all "government-only" options appear in the transport sector and have relatively large reduction potentials.

After this filter is applied, 26 options remain available, with a total reduction potential of 7.2 $MtCO_2e$.

Filter 4: Options must be additional
All calculated reduction potentials are additional with respect to a reference scenario used by ECN/PBL, i.e. the adopted policies in place by 2010. Since 2010, few climate policies were implemented in the Netherlands, e.g. SDE and SDE+, but it was out of the scope of the current analysis to perform an additionality assessment against current policies[21].
A basic check against planned policies[22] shows that two planned policy measures potentially overlap with the options available for domestic offsetting, i.e. CO_2 standards for vans and CO_2-standards for trucks. This could reduce the available potential by a maximum amount of 0.65 $MtCO_2$. In order not to move the reference scenario, this impact has not been taken into account in the current analysis.
An exception to this rule is six agricultural options which mainly apply to the glass-roofed horticultural sector. In this subsector a sectoral emissions trading system has been set up and it is clear that emission reductions within this subsector cannot be considered additional. The excluded options are: Small scale CHP, bio-oil fired CHP, and CO_2 supply to the glass-roofed horticulture.

After applying this filter, 20 options remain available (see Table 5), with a total reduction potential of 4.6 $MtCO_2e$.

[21] Other recent policy measures that may lead an increase of emissions (and hence a larger reduction potential), like the increase of the maximum speed limit on highways, have not been taken into account as well.
[22] As notified in "Effectinschatting voorgenomen beleid. Notitie IenM, 6 april 2011, aangepast 27 mei 2011".

Table 5: Overview of CO_2 reduction options potentially available for domestic offsetting after filter 4

Option	Sector	Net reduction ($MtCO_2e$)	Cost effect. end-user (€/tCO_2)
CO_2 standard vans[23]	Transport	0.34	-229
Efficient heating behaviour households	Built environment	0.02	-207
Efficient heating behaviour households	Built environment	0.18	-207
Utilization of waste heat in households	Built environment	0.06	-177
Thermal insulation in existing households	Built environment	0.31	-155
Utilization of waste heat in households	Built environment	0.17	-153
CO_2 standard vans	Transport	0.20	-153
More efficient tires	Transport	0.98	-128
More efficient tires	Transport	0.26	-127
Heat pumps in utility sector	Built environment	0.08	-113
Heat pumps in utility sector	Built environment	0.06	-107
CO_2 standard trucks	Transport	0.20	-66.6
Small scale CHP utility sector	Built environment	0.41	-60.4
CO_2 standard vans	Transport	0.01	-56.2
Small scale CHP utility sector	Built environment	0.30	-54.6
Small scale CHP utility sector	Built environment	0.32	-49.2
Manure digestion with co-substrate cattle farms	Agri- and horticulture	0.63	-48.2
CO_2 standard vans	Transport	0.02	-42
Reduced heat demand agriculture	Agri- and horticulture	0.00	14.5
Reduced heat demand industry non-ETS	Others	0.01	15

The available potential has been identified under the assumption of a € 30/tCO_2 price level support (filter 2). Since none of the significant options for reduction measures have costs between 0 and € 45/tCO_2, this potential does not change significantly when other CO_2 price assumptions are applied under filter 2. Furthermore it is interesting to note that most options identified have negative costs meaning that most likely, rather than costs, other barriers to achieving these measures exist.

[23] CO_2-standards are most often imposed by national or EU legislations. In theory (a part of) the potential can still be eligible for domestic offsetting: for instance if a sector adopts a CO_2-standard that goes beyond the EU or NL policy. The additional part could be stimulated with credits, but will be below the potential indicated in the table.

In Chapter 6, 4.6 $MtCO_2$. reduction potential that potentially could be targeted under a domestic offsetting scheme is taken as a starting point to derive a realistic potential for domestic offsetting in the Netherlands, taking into account issues such as transaction costs, practical barriers, benefits and specific issues related to some of the design options defined in the next chapter.

5 Design options for domestic offsetting in the Netherlands

Which design option could potentially lead to a reduction potential in a cost-effective manner?

5.1 Introduction

There are a number of options in terms of the potential design of a domestic offset scheme. Choices on different elements of scheme design can influence the overall cost effectiveness and ambition of the scheme. Identification of the most suitable scheme design will depend on the outcome of ongoing developments at both the UNFCCC and EC level. For example, continuation of the JI would open up a further option to use the domestic JI framework in a similar way to neighbouring countries France and Germany. Therefore further attention to developments at the international and EU level are important in order to ensure that opportunities to consider other design options are not missed.

5.2 Three possible DO design options for the Netherlands

This section explores three different possible design options for a Dutch domestic offset scheme in detail, and examines their suitability, advantages and disadvantages. Multiple design variations exist, but we have selected these three from a long list of options, using a number of key criteria. The long list of options included:

1. EU ETS linkage and use of Article 24a.
2. Government purchase of domestic credits.
3. AEA trades with upfront investments in the Netherlands.
4. AEA trades with subsequent investment in the Netherlands.
5. Use of voluntary offset standards.
6. Joint Implementation for domestic projects in the Netherlands.
7. Non-ETS cap and trade scheme in combination with a sectoral crediting scheme.

These options were assessed against the criteria of overall complexity and sustainability. For example, due to the uncertain future of the JI mechanism, this option (nr. 6) was excluded. The relative complexity of the non-ETS cap and trade scheme in combination with a sectoral crediting scheme (nr. 7) has been reason to exclude this option as well. From the remaining options, option 2 – 4 can be considered as variants of one generic option. This results in a shortlist of the three most likely design variations. These three options are selected as those that could offer potential for the Dutch context and cover the key relevant issues related to the subject, taking into account the specific sectors and reduction options that would be most likely to be targeted under a domestic offset scheme.

In all options below, prevention of double counting is maintained by cancellation of an equivalent amount of AEAs compared to the amount of credits generated. We assume here that the emission reductions achieved are taken into account (i.e. become visible) in the national monitoring of non-ETS emissions, otherwise the government would face a financial risk. In practice, in many cases presently the monitoring is realised top down, instead of bottom-up. In case this causes the risk mentioned above, there will be additional costs involved in the necessary adjustment of the monitoring protocols.

5.2.1 Domestic offsetting via Article 24a of the revised Emissions Trading Directive

Article 24a of the revised Emissions Trading Directive (Decision No 2009/29/EC)

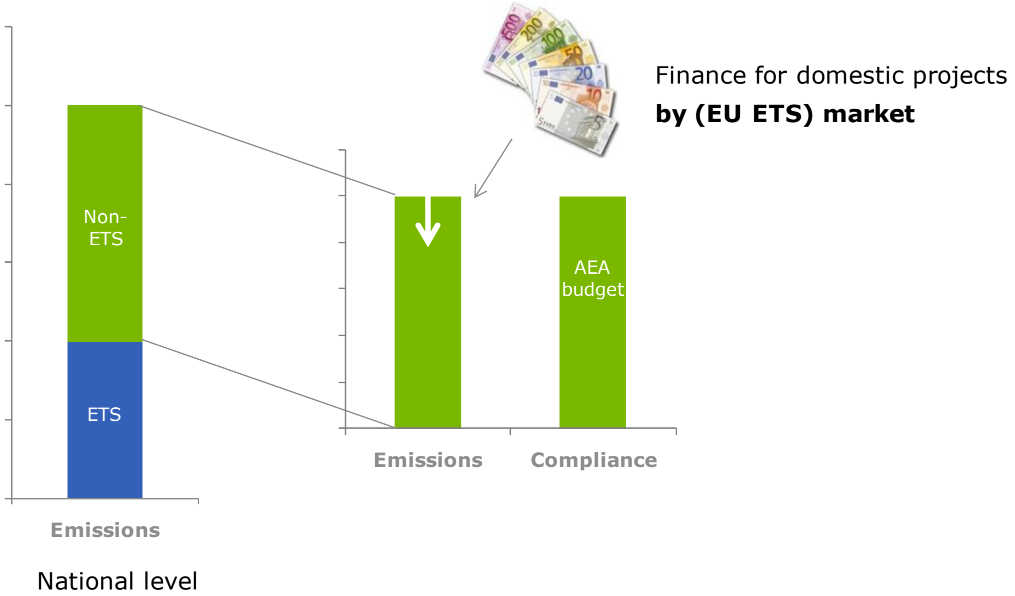
"—[Implementing] measures for issuing allowances or credits in respect of projects administered by Member States that reduce greenhouse gas emissions not covered by the Community scheme may be adopted."

Article 24a of the revised EU ETS Directive mandates the Commission to adopt implementing legislation which would allow Member States to issue credits or allowances from projects that reduce emissions in sectors outside the scope of the EU ETS.

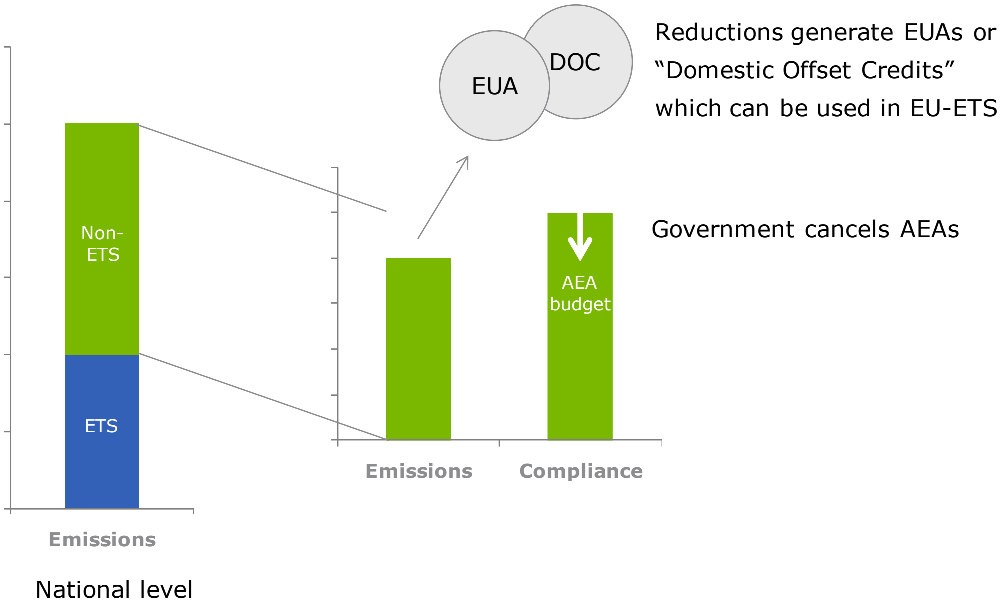
The issues surrounding the Article include uncertainties on the interpretation of the text, the design options of the mechanism, the exact role of the EU Commission and for Member States, and the relationship with the Joint Implementation flexible mechanism of the Kyoto Protocol.

Under an Article 24a approach the domestic offset programme would serve as a mechanism to provide flexibility for EU ETS participants, while simultaneously incentivising emissions reductions in non-ETS sectors.

As Figure 8 shows below, the purpose of Article 24a is to allow EU ETS participants to finance emissions reductions in non-ETS sectors, and then use the ensuing credits for compliance with the EU ETS. Although details on the implementation of this option are not available, it is very clear from the Effort Sharing Decision (Article 10b) that an equivalent amount of AEAs need to be cancelled in order to avoid double counting of emission reductions. Hence, this design option – if implemented - will not contribute to reaching the non-ETS target of the host country in the short term.
As this mechanism is financed by private investors, there would be minimal transaction costs for the government.



Step 1



Step 2

Figure 8: Article 24a approach

This approach is dependent on an agreement at the European level that this Article should be used, and relies on further legislation to be implemented. Furthermore, there would need to be agreement between EU member states on the modalities of its application. The option has the following characteristics:

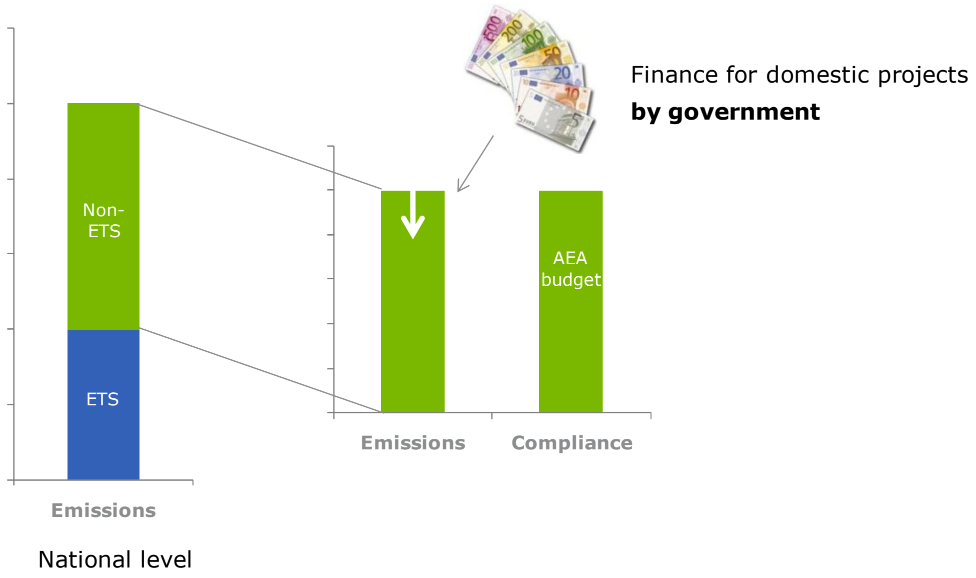
- It could offer a clear route to developing projects in the absence of a Kyoto and JI structure that is embedded in European legislation.
- It is a direct link to an established source of demand i.e. the EU Emissions trading scheme.
- It has the potential to use existing agreed methodologies for projects and processes developed under existing standards. Where methodologies do not yet exist for project types identified in Chapter 4, new methodologies can be developed, so that all abatement potential can potentially be exploited.
- It allows for the EU ETS to access lower cost reductions outside their sectors, potentially reducing costs to Dutch industry of meeting EU ETS targets [given the negative costs of the main measures identified].
- It requires further implementation legislation from the European Commission. There is no certainty on the time frame that would be needed for this to occur, and would require political will from a number of different parties.
- It offers less possibility for control over the design of this option, as this may be structured at EC level. Interests of other countries could therefore dominate. Should the Commission implement this option in the future, the scope of eligible project activities could determine the level of benefit for the Dutch government. Inclusion of some project activities could lead to a large supply of relatively cheap domestic credits in the market (e.g. from less efficient non-ETS industries in Eastern Europe), leading to low demand for credits from the Netherlands. A more restricted scope to exclude these project types could help to focus abatement on activities with an abatement cost similar to that of abatement options within the Netherlands, ensuring competitiveness.
- It results in non-ETS emission reduction to move from contributing to the national non-ETS target to contributing to the European ETS target. [Assuming the cheaper reduction options would be used to bring under the ETS, the remaining reductions necessary under the non-ETS would potentially be the most expensive ones.]

5.2.2 Government purchase options

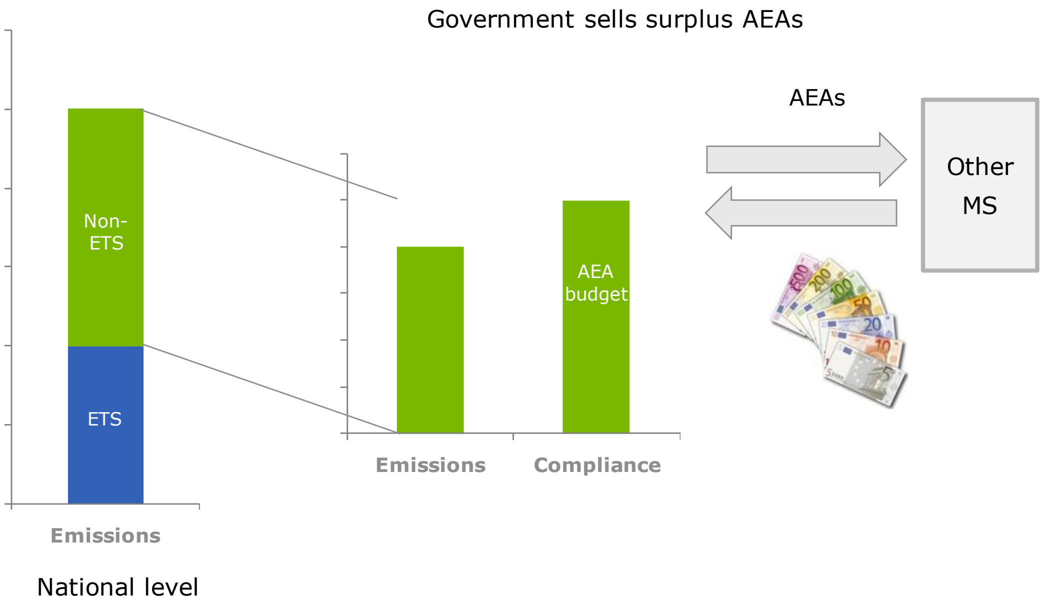
A scheme where the government commits to 'buy' (pay for) the emissions reductions generated could be established. A purely government option would require the government to accept a cost for the emissions reductions generated. However, this can be alleviated by combining a government buyer approach with a trade of AEAs equivalent to the reductions generated making it a real offsetting mechanism (i.e. used by other countries to fulfil their obligations). This could be implemented using two different formats:

Option A: Government purchase scheme with subsequent AEA trades

Under this option, the government would commit to pay for the reductions generated by a domestic offset scheme. Figure 9 below demonstrates the two main steps involved in this approach.



Step 1



Step 2

Figure 9: Government buyer approach with subsequent AEA trades

In step 1, the government submits a tender calling for proposed domestic emissions reduction projects. The government can then screen proposals and select projects it finds acceptable. These projects are then implemented, and the project developers are paid a fixed amount per ton by the government for the emissions reductions they generate.

In step 2, the government then sells an amount of AEAs equivalent to the reductions realised by the project, in order to recoup the money paid to the project developer.

The characteristics of this option are the following:

- The government is able to recoup the cost of purchasing the credits generated by approved projects, but is exposed to a risk of low or no demand for AEAs, which could occur in the event of a recession, for example, where emissions drop because of lower production. This would mean that the government is not able to recoup the cost of reductions generated.
- The government can control the number of projects selected, and can design a scheme that is suited to national priorities (e.g. approving activities only in specific sectors etc).
- This option makes uses of the instrument of AEA trade. It is not yet clear at which price AEAs can be traded. There is a risk that AEAs, once they are traded, are valued below the price for which the government had financed the emissions reductions[24] .
- The government needs to finance achieved emission reductions upfront. This will require the availability of cash budget to do so.
- The government would have to undertake design of the processes and methodologies needed for screening and verifying the reductions realised. This burden can partly be mitigated by adapting existing processes (e.g. from JI), but the government would still need to approve verifiers etc.
- The effectiveness to reduce emissions of this design option is dependent on the uptake of projects by project developers. In other words: the scheme does not provide certainty on the amount of emissions reductions that will be achieved. Previous experiences in the Netherlands from the "CO_2-reductie-plan"[25] underpin this risk. In the CO_2-reductieplan the government reserved a significant budget to tender CO_2 emission reduction projects, but a limited amount of projects were initiated, using only a limited amount of the budget.

[24] If the AEA price is valued equal to the price the government has paid for emissions reductions, additional costs related to inflation correction and interest are encountered.
[25] Tweede Kamer, vergaderjaar 2002 – 2003, 25 026, nr. 13. Available at: http://cdn.ikregeer.nl/pdf/kst-25026-13.pdf.

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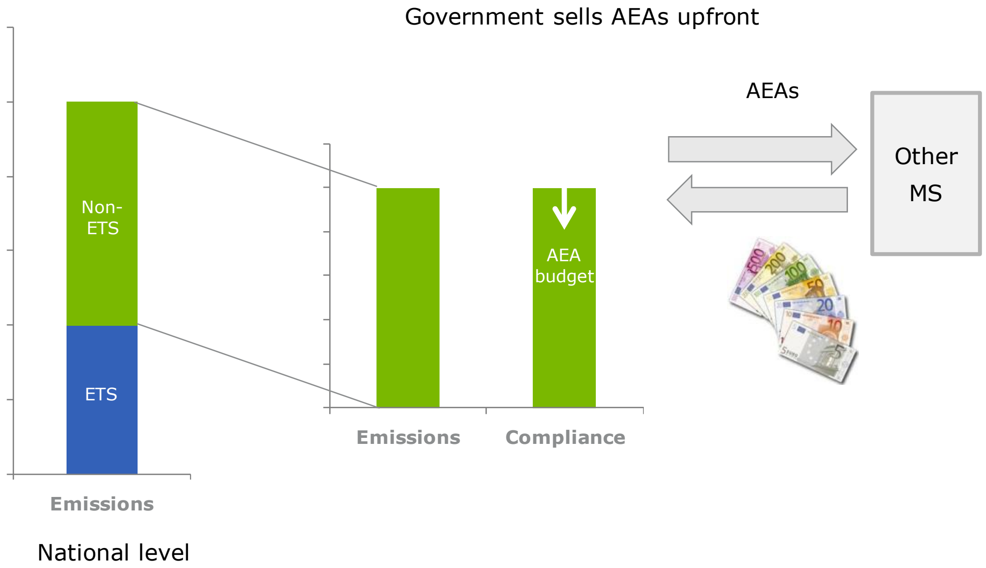
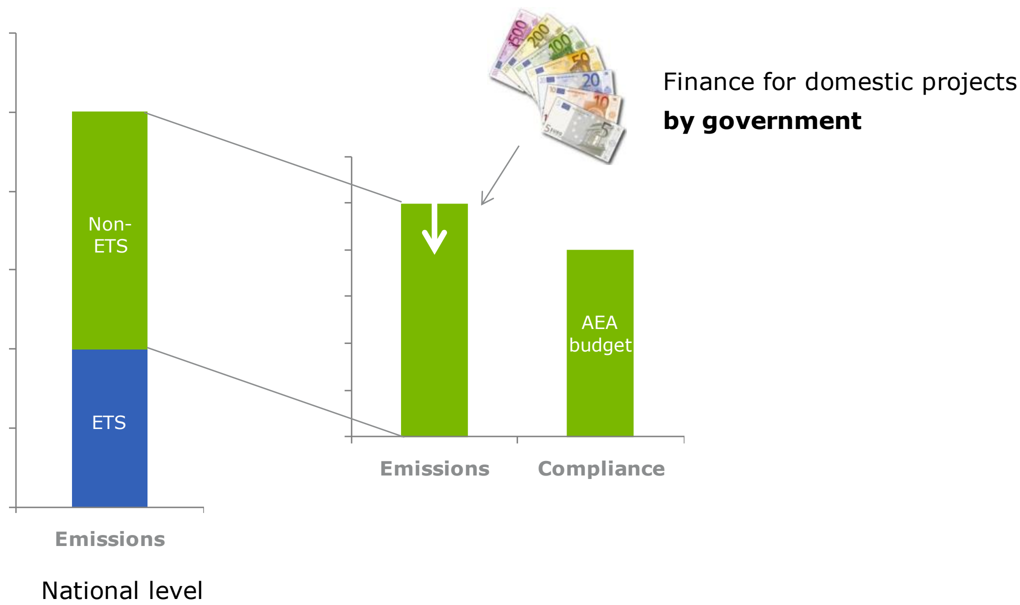
Option B: Upfront AEA trades and subsequent domestic emissions reduction purchase

This option essentially reverses the steps in the previous option, in that the government would first sell an amount of AEAs, and then use the capital generated to fund domestic emission reductions.



Step 1



Step 2

Figure 10: Upfront AEA trades and subsequent domestic emissions reduction purchase

The characteristics of this option are:

- There is no upfront outlay for the government, and therefore no financial risk in implementing the scheme. However, there is a risk that AEA revenues may become disconnected from domestic emissions reduction projects (e.g. due to a lack of interest in the scheme), which would then damage work towards meeting (future) ESD targets.
- The government can control the number of projects selected, and can design a scheme that is suited to national priorities (e.g. approving activities only in specific sectors etc.).
- The government would have to undertake design of the processes and methodologies needed for screening and verifying the reductions realised. This burden can partly be mitigated by adapting existing processes (e.g. from JI), but the government would still need to approve verifiers etc.
- The effectiveness to reduce emissions of this design option is dependent on the uptake of projects by project developers. In other words: the scheme does not provide certainty on the amount of emissions reductions that will be achieved. Previous experiences from the "CO_2-reductie-plan"[26] underpin this risk. In the CO_2-reductieplan the government reserved a significant budget to tender CO_2 emission reduction projects, but a limited amount of projects were initiated, using only a limited amount of the budget.

5.2.3 Adoption of a voluntary framework

This option would open up domestic emissions reduction activity to the established voluntary credit market. In this approach, the government would accept the implementation of projects using a voluntary carbon credit standard (e.g. Gold Standard, VCS). Using this approach, project developers may be incentivised to undertake projects in exchange for internationally recognised credits. For all VERs generated the government would need to cancel an AEA, in order to avoid double counting, as required by most standards. Note therefore that the government should not seek to purchase the VERs generated by domestic projects, as this would lead to a double cost – the value of the cancelled AEA, and the value of the VER credit.

[26] Tweede Kamer, vergaderjaar 2002–2003, 25 026, nr. 13. Available at: http://cdn.ikregeer.nl/pdf/kst-25026-13.pdf.

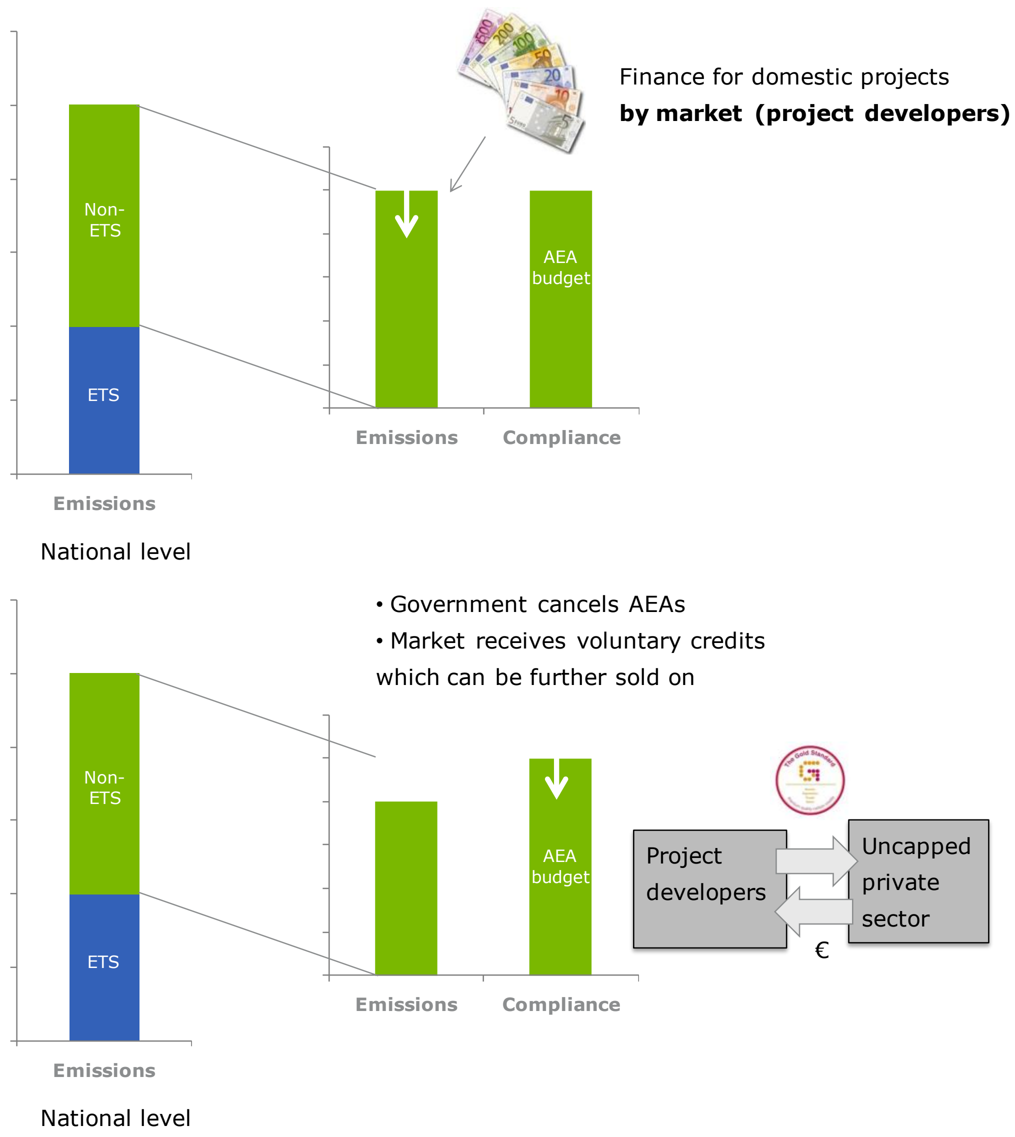


Figure 11: Adoption of a voluntary framework

Figure 11 illustrates how this approach would work. Firstly, a project developer undertakes an emissions reduction project, using the voluntary standard framework approved by the government for the purposes of the domestic offset programme.

When the voluntary standard issues the credits (known as Verified Emissions Reductions, or VERs), then the government cancels an equivalent amount of AEAs, in order to avoid double counting of emissions reductions. The VERs are then free to be sold by the project developer to private investors.

The characteristics of this option are the following:

- The effectiveness to reduce emissions of this design option is dependent on the uptake of projects by project developers. There is no guarantee of uptake by project developers, especially if international VER prices are low, as they currently are. In other words: the scheme does not provide certainty on the amount of emissions reductions that will be achieved.
- Via the established international voluntary credit market, there is a clear more or less guaranteed demand for the credits generated. In the voluntary market, prices are currently converging with other carbon prices e.g. EUAs and CERs. Many structures and standards already exist that could immediately be used by the private sector in establishing projects, reducing the burden on policy-makers in setting up the scheme and allowing the scheme to be designed in a more cost-effective way.
- There is no dependency on upfront financing by the government.
- In the case of international sale of the VERs generated an equivalent number of AEAs would need to be cancelled to avoid double counting.
- The government only allows the Gold Standard and CDM-equivalent projects for offsetting its own emissions[27], setting a good practice example for the voluntary market. This restricts the abatement potential within the scheme. The Gold Standard in particular has restrictions on eligible project types, and large scale implementation of voluntary projects in capped countries such as the Netherlands is a novelty that would need further discussions with voluntary standards such as the Gold Standard. We recommend that in these discussions the Netherlands maintains its current position on the level of credibility and environmental integrity of voluntary credits they accept.

[27] CDM credits are typically developed and bought for compliance in the EU ETS, or by governments to assist compliance with Kyoto targets. However, they may also be bought by voluntary buyers who trust in the robustness of the CDM standard.

6 Domestic offsetting as a policy option for the Netherlands

6.1 Introduction

In Chapter 3, we identified a cost-effective, technical reduction potential of 4.6 $MtCO_2$ in the non-ETS sectors in the Netherlands that could potentially be targeted via domestic offsetting in the Netherlands. In Chapter 4, we discussed three possible design options for a domestic offsetting scheme. In this Chapter, we assess in more detail the reduction potential that can in practice be targeted via a domestic offsetting scheme by looking at transaction costs, other barriers and issues specific to some of the design options. We also assess the public costs involved in setting up a domestic offsetting scheme in the Netherlands. We finish with a number of other relevant criteria to take into account before concluding whether a domestic offset scheme could contribute in a meaningful way to emission reductions in the non-ETS sector in the Netherlands and if so, which of the design options identified is most likely to do so.

6.2 Real potential for domestic offsetting in the Netherlands is small

In Chapter 3, we identified a cost-effective, technical reduction potential of 4.6 $MtCO_2$ in the non-ETS sectors in the Netherlands that could potentially be targeted via a domestic offsetting scheme. Although the CO_2 price signal coming from a domestic offsetting scheme should provide an incentive to make all of the options identified economically more attractive, the overall realistic potential that can be tapped by domestic offsetting is much smaller than this estimate because:

1. Transaction costs for the project developer make some options less attractive.
2. Barriers and practical implementation issues prevent the options from being applied.
3. Restrictions related to the specific design options identified in the previous chapter.

1 Transaction costs

Transaction costs are defined as costs to project developers to participate in the market. This includes feasibility studies, administrative documents, monitoring plans etc. High transaction costs restrict overall abatement potential, as project developers will only undertake activities in which they will be able to justify the expense of undertaking the project.

An important indicator of transactions costs is the project size: when a reduction measure typically has small project sizes, (e.g. efficient heating behaviour of households) transactions costs are relatively high and can become a substantial hurdle for private investors. When project sizes are large (e.g. deep geothermal heat supply), transaction costs are relatively low.

Other factors that influence the transaction costs include the complexity of the project, the stringency of the additionality requirement, and fees required by the regulatory body.

Explicit numbers on transaction costs are difficult to find in the literature. UNEP[28] gave indicative numbers for CDM project activities in their guidebook to financing CDM projects. We assume that the transaction costs are applicable to Domestic Offsetting projects as well since similar procedures and methodologies are expected to be used. From the given ranges we took the upper level into account to compensate for changes and price increases since the date of publication. Typical prices for the validation and the paperwork prior to the registration come to:

- Approx. 200 k€ for large scale projects with required methodology;
- Approx. 125 k€ for large scale projects with methodology already available;
- Approx. 75 k€ for small scale projects[29] with required methodology;
- Approx. 35 k€ for small scale projects with methodology already available.

Further costs for periodical verifications are required which are in the range of 12 to 20 k€. In addition to these inherent costs, internal costs that have not been invoiced as well as costs for monitoring equipment and activities have to be covered. With these additional costs the total transaction cost level can easily be twice the amount mentioned above or even more if projects have a very high complexity. Along this line it can be concluded that a certain minimum size of an offset project is required in terms of expected annual certificates to cover the transaction costs and to reach at least a balanced cost benefit ratio for the participation in the project-based mechanism.

In the context of existing project based mechanisms (JI, CDM, Voluntary projects), the issue of project size in relation to transaction costs has been an issue of concern. Two concepts, that of bundling and programme of activities have been developed to transform small projects into larger projects in order to reduce the relative transactions costs.

Bundling of emissions reduction projects groups individual small-scale projects together in a single project document, rather than one for each project. A collective baseline is set, and projects are registered and verified as if they were one project. All projects have to be included and detailed at the start of the project process. No projects can be added at a later date. If one project fails it can cause significant complications as it impacts the collective baseline.

A Programme of Activity also allows several small-scale projects to be grouped together using streamlined documentation. In a PoA approach a developer submits a POADD, a design document detailing the type of programme to be undertaken. Then individual documents are added for each specific project of this nature within the programme. Verification is done on a sampling basis rather than by each individual project. Projects can also be added to the programme at any time.

[28] UNEP (2007): Guidebook to Financing CDM Projects. EcoSecurities. Available online at http://www.cd4cdm.org/Publications/FinanceCDMprojectsGuidebook.pdf, checked on 4/04/2012.
[29] Small scale is defined as a maximum output of 60 GWh/year for an energy efficiency improvement project, or an emission reduction of less than or equal to 60 ktCO_2e/year.

Both bundling approaches and PoA approaches exist in the CDM, JI, the Gold Standard and other voluntary standards such as the VCS.
Considering the different design options presented in Chapter 4, the government buyer scheme could be developed[30] such that the approaches described above would also be eligible. The Article 24a scheme is not yet defined, but it can be assumed that an approach developed under such a scheme would be comparable to the CDM and JI procedures allowing for bundling and PoA type of approaches as well. As a result, we conclude that all the design options proposed in Chapter 4 impose more or less equal transaction costs to project developers.

2 Other barriers and practical implementation issues

It is striking that many of the options given in Table 6 (see Chapter 3) already have substantial negative costs, but have not been implemented. This observation suggests that there are other barriers that play a role here. Although the CO_2 income from domestic offsetting systems makes all these options even more economically attractive, it is at least questionable whether this incentive is sufficient to overcome these apparent existing barriers. Typical barriers include issues such as the lack of capital available, ownership issues such as the landlord/tenant issue and lack of knowledge about the abatement options available to the entities that could implement the option. It is beyond the scope of this study to assess these barriers in detail at the level of individual abatement options, but we do recommend to assess more in detail whether a domestic offsetting scheme is likely to overcome these barriers and if yes, whether domestic offsetting is the most appropriate policy option to overcome these barriers, before deciding on the set-up of a domestic offsetting scheme in the Netherlands.

The reduction potential that is available for a possible DO mechanism has also not yet been assessed against barriers related to baseline setting and monitoring. For some measures in the transport and built environment sector, these are well-known and significant obstacles. As well as being linked to increased transaction costs (as described above), these practical barriers can make it near impossible to see projects through to completion. These barriers make it, for example, highly unlikely that the three transport options included so far (standards for trucks and vans and more efficient tyres) will be realised via domestic offsetting, since the actual emission reductions achieved are influenced by many factors related to individual driving behaviour. To our knowledge, there is also no existing baseline and monitoring methodology that adequately deals with this issue (see also in the discussion on the specific design options below). Another issue related to monitoring is that of consistency/compatibility with the national emission monitoring methodology. Most emission reductions can only be monitored bottom-up. If for the same emission source, a top-down methodology is used in the national emission monitoring, the reductions might not be visible in the national monitoring methodology.

[30] Take as an example the Danish scheme, wherein the government designs its own requirements. This can streamline processes seen under existing standards, and reduce overall transaction costs. However, as any simplification of procedures must be balanced with a need to ensure quality assurance of emissions reductions generated, overall savings on transaction costs are likely to be limited.

AEAs would then be cancelled or sold for reductions that can not even be traced in the national monitoring and this would thus involve the need to change the national monitoring methodology which does come with costs.

Last but not least, the issue of additionality to existing and planned policies is not always easy to determine taking into account the rather dense policy environment in the Netherlands with negotiated agreements, green deals etc. For some of the options now in the list (e.g. the transport options), further policy is foreseen at the European and national level, leaving the question of whether such options should be open to a domestic offsetting scheme in the period just before implementation. Given the typical crediting period of projects under a domestic offsetting scheme, this is an issue that will continue to pop-up, adding to the complexity of the domestic offsetting scheme.

3. Restrictions related to the specific design options

In addition to the more general issues described above, each of the design options, as set out in Chapter 4, has a different amount of flexibility in their design to allow access to the potential available in the policy options described in the long list of potential in Chapter 3.

Under **the Article 24a option**, the EU ETS legislation stipulates that projects:

- Should not lead to double counting of emission reductions;
- Do not impede the undertaking of other policy measures;
- Cannot be opted into the ETS via Article 24.

Although crediting via Article 24a will always be designed such that no real double counting will occur (i.e. the total cap will not be changed), in our view it is unlikely that options that have a direct link to EU ETS emissions will be allowed under Art. 24a. The following options have a clear interaction with ETS emissions, and therefore are unlikely to be a possibility under this design option:

- Waste heat use in households, assuming the waste heat will come from ETS installations;
- Small scale CHP option, influencing the electricity production under the ETS;
- The heat pump option, as above.

All of these options could thus also have an effect, albeit very small if only implemented in the Netherlands, on the CO_2 price in the ETS. This could increase in scale though if implemented EU-wide, which is more likely with this design option. All considered, we regard it highly unlikely that these options would be allowed under an Article 24a based design.

For the **government buyer** options, the scope of eligible measures could be structured to ensure that identified cost effective potential can be accessed. Taking into account the barriers related to monitoring the transport options explained above, this means that the government buyer scheme could, in theory, encompass all the measures identified in Chapter 3 except the transport options.

A possible restriction may arise from European state aid rules, which may prevent the government from targeting certain sectors or measures through a financial instrument like domestic offsetting. This should be carefully assessed from a legal point of view.

In the **voluntary market approach**, the standards recognised by the Dutch government are the CDM, the Gold Standard, or equivalent ones. However, the CDM cannot be used to develop projects in Annex 1 countries. Therefore, all projects developed under the voluntary market approach would have to be developed using the Gold Standard, generating Verified Emissions Reductions (VERs).

Within the Gold Standard, there are some restrictions on eligible project types. The Gold Standard only allows projects to reduce carbon dioxide, methane or nitrous oxide. Furthermore, permitted project types are restricted to three categories:

- Renewable Energy Supply – defined as the generation and delivery of energy services (e.g. mechanical work, electricity, heat) from non-fossil and non-depletable energy sources.
- End-use Energy Efficiency Improvement - defined as the reduction in the amount of energy required for delivering or producing non-energy physical goods or services. Project activities must implement measures to reduce energy requirements as compared to the baseline without affecting the level and quality of the services provided (service equivalence).
- Waste Handling and Disposal - refers to all waste handling activities that deliver an energy service (e.g. LFG with some of the recovered methane used for electricity generation) or a usable product with sustainable development benefits (e.g. composting).

Of the abatement potential identified in Chapter 3, projects involving CO_2 standards in the transport sector are not eligible for the Gold Standard. It is useful to see what eligible methodologies already exist that cover the remaining measures identified. The Gold Standard accepts all CDM methodologies that fit its scope and has also approved some other Gold Standard-specific methodologies.

Table 6: Existing methodologies for available reduction options in NL under a voluntary market approach

Option (from Chapter 3)	Existing methodology?
Efficient heating behaviour households	Gold Standard: Technologies and practices to displace decentralised thermal energy consumption
Heat pumps in utility sector	CDM: ACM0012 Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects; AMS-III.Q.: Waste Energy Recovery (gas/heat/pressure) Projects
Manure digestion with co-substrate cattle farms	CDM: ACM0010 Consolidated baseline methodology for GHG emission reductions from manure management systems
Small-scale CHP utility sector	CDM: AMS-I.C. Thermal energy production with or without electricity
Thermal insulation in existing households	CDM: AMS-II.E. Energy efficiency and fuel switching measures for buildings; AMS-II.A. Supply side energy efficiency improvements – transmission and distribution (for district heating systems)
Utilisation of waste heat in households	CDM: AMS-III.Q. waste energy recovery (gas/heat/pressure) projects; AM0058 Introduction of a new primary district heating system
Reduced heat demand agriculture	CDM: AMS-II.F. Energy efficiency and fuel switching measures for agricultural facilities and activities
Reduced heat demand non-ETS	CDM: AM0049 Methodology for gas based energy generation in an industrial facility; AMS-II.B.: Supply side energy efficiency improvements – generation

CDM methodologies in Table 6 that begin with 'AMS-…' are small-scale methodologies and can only be applied to projects that meet the following characteristics:

- Renewable energy projects of less than 15 MW capacity;
- Energy efficiency improvement projects of less than 15 GWh/year;
- Other projects of less than 15 ktCO_2e emissions.

Under the CDM, whose methodologies are accepted by the Gold Standard, there is no restriction proscribing the development of methodologies to cover the remaining options. However, this would entail some cost (to the entity that prepares and submits the proposed methodology to the CDM Board), and the Executive Board has the right to reject methodologies that do not meet its requirements. The transport sector in particular currently does not have many approved methodologies, due to challenges in establishing acceptable monitoring practices.

Conclusion: the real potential for a domestic offsetting scheme in the Netherlands is small

In the table below, we give a qualitative judgement on the project size (related to the transaction cost barrier), issues related to monitoring and setting good baselines, issues related to the additionality of the options to existing and planned policy and interaction with emissions in the ETS (which could be prohibitive for the Article 24a option). Although it is difficult to accurately estimate the remaining potential that can effectively be tapped via a domestic offsetting scheme taking into account these barriers, we estimate this potential to be in the range of maximal 0.5 – 1 MtCO_2, i.e. smaller than 1% of current non-ETS emissions. The experiences of other EU countries as summarised in Chapter 3 provide further proof that typically the project volume under domestic offsetting schemes are low, especially taking into account that all major point sources of GHG emissions are already included in the EU ETS from 2013 onwards.

Table 7: Options after filter 4, potentially available for domestic offsetting.
Green indicates no issues, orange indicates possible issues, red indicates serious issues that prevents the option from being suitable for domestic offsetting.

Option	Project size	Issues related to monitoring	Issues related to additionality	Interaction with ETS
CO_2 standard for vans	**need for PoA and/or bundling**			
CO_2 standard for trucks	**need for PoA and/or bundling**			
More efficient tires	**need for PoA and/or bundling**			
Utilization of waste heat in households				
Efficient heating behaviour households	**need for PoA and/or bundling**			
Thermal insulation in existing households	**need for PoA and/or bundling**			
Heat pumps in utility sector	**need for PoA and/or bundling**			
Small scale CHP utility sector	**need for PoA and/or bundling**			
Reduced heat demand agriculture	**need for PoA and/or bundling**			
Manure digestion with co-substrate in cattle farms				
Reduced heat demand industry non-ETS				

6.3 Net costs for government vary by scheme

This section examines the expense of introducing a domestic scheme for the government. Costs to government can be incurred through the purchase of credits, or through the cost of establishing and maintaining a scheme. This analysis indicates how the different design options lead to different costs for the government.

Purchase of credits – direct costs

In the **Article 24a approach** the government would not incur a net purchasing cost as it would not buy the credits generated. The credits would instead be purchased for compliance in the EU ETS by EU ETS participants.

Under the **government buyer** approach the cost of the purchase of the reductions generated is offset through the sale of AEAs. In the variant where AEAs are sold ex ante, the amount of reductions that the government can purchase is clearly defined and the government can tailor activity towards this budget. However, under the variant of this option where domestic reductions are implemented before AEAs are sold, then there is a risk that the government may not recoup all of the cost of measures implemented if the value per credit awarded to project developers is not matched to the price of AEAs.

In the **voluntary market approach** the government would not incur a net direct purchasing cost as the credits would be sold to international voluntary market investors with only AEA cancellation for the reductions realised.

The different design options result in trade of allowances or credits on three different carbon markets. The government buyer approach results in the Netherlands selling the surplus AEAs to other countries. In the voluntary market approach, the resulting credits are sold on the voluntary market and in the Article 24a option, finally the credits enter the ETS market. Whereas the voluntary and ETS markets are well established and good price predictions are available, this is not the case for the trade in AEAs. This makes the development of a government buyer scheme at this moment in time the most uncertain and risky in terms of estimated income or costs.

Administration costs

As well as purchasing costs the government also has to consider administration costs. Administration costs could cover the cost of manpower (e.g. functionaries, lawyers and technical experts) to develop the processes, procedures and framework of the scheme, as well as the cost of manpower and resources to validate and market the scheme, record activity and performance, and issue credits.

Although development of **Article 24a modalities** will take place at the European level, thereby removing these costs for the Dutch government, the government would still likely face responsibility (and therefore cost) to oversee activity within its borders. This cost could be similar to that of maintaining the Designated Focal Point for the Netherlands for CDM/JI projects, or similar to the costs estimated for the voluntary market approach as described below.

However, it is possible that the Netherlands would be required to design and implement several national procedures itself, which would increase costs. As an EU initiative, the burden to transfer the legislative requirements into Dutch law are likely to be stringent, requiring more thorough consideration and adding cost to the estimate for the voluntary approach. We can therefore estimate the cost of this approach at somewhere between 1 and 4 times the cost of the voluntary market approach depending on the variables mentioned above.

Under the **government buyer** approaches the government would face the largest net cost for the development and administration of the scheme. This would include development, or at least selection, of approved methodologies, requirements and procedures, as well as implementing the tender approach and screening of proposed projects. This would require input from a much wider range of experts and legislators, and could increase costs by up to 10 times the amount under the voluntary market approach. The government could outsource validation and verification responsibilities, but would also have to screen and accredit independent verifiers that could undertake this work. However, this cost could be covered by requiring potential verifiers to pay an application fee as part of the accreditation process.

Under the **voluntary market approach** the government would incur very little net administration cost related to the introduction, development and regulation of the scheme, as this would be done by the overseers of the approved voluntary standard(s), e.g. the Gold Standard or CDM. Potential costs could include:

- 1-2 full-time staff to approve projects to take place within the Netherlands, record activity and performance, and issue credits. This implies an estimated cost of € 150,000 per year.
- Optional technical experts: to assess the additionality of certain project and the robustness of individual methodologies. This implies an estimated additional cost of € 50,000 – 100,000. Note that screening of individual methodologies could be perceived as a criticism of the standards overall and therefore could be politically sensitive.

Project developers would pay independent entities to validate and verify projects, and assume all other transaction costs.

An approximate comparison of costs to the government is provided below.

Table 8: Estimated range of administrative costs for government

Option	Estimated range of administration costs
Government buyer	€ 1-1.5 million/yr
Voluntary market	€ 250,000 - 300,000/yr
Article 24a	€ 250,000 – 1 million/yr

The administration costs for the government could be lowered by requiring project developers to pay a fee for each administered project. In the ideal situation that 1 MtCO_2 emission reductions would be realised per year, a € 0.25/tCO_2 fee could compensate the governmental costs fully or to a very large extent, while this would cost project developers only a fraction of the CO_2 credit price they would receive[31]. Nevertheless, if the market realizes a much smaller amount of reductions, the government cannot compensate its administrative costs. This will certainly be the case in the first years of the scheme.

Future costs

The government may also want to consider how implementing a domestic offset scheme may affect costs to government in the future. Under the voluntary market approach, the easier to implement options could be taken up by the private sector. Although this is desirable in the short term, in the longer-term such an approach may leave the government to implement the remaining, most costly and difficult to achieve, options.

6.4 Discussion of pros and cons

Domestic offsetting as a means to reach short and long term non-ETS commitments?

Introducing a domestic offsetting scheme in the Netherlands will not directly contribute to reaching the Dutch non-ETS emission reduction targets in the short term, based on the assumption that the Netherlands will trade or cancel an amount of AEAs that is equivalent to the reductions achieved. In the government buyer option the AEA surplus is sold to other countries. In the other two options AEAs need to be cancelled in order to create voluntary domestic credits, which are sold on the voluntary market, or domestic credits or allowances that are either used for compliance in the ETS. In these two options cancellation of AEAs is essential to avoid double counting of the emission reductions. Opportunities to ensure a positive contribution to the Dutch non-ETS targets in the short term exist, but are not discussed in this study.

[31] A fee will increase transaction costs for project developers, eating up typically 1–5% of the direct financial benefits. To what extent this would negatively impact the amount of cost-effective projects, needs further study.

Such options include setting stringent baselines or applying a discount factor to the reductions generated so that the credits generated with the project (and thus not counting towards reaching the target via the reasoning given above) are smaller than the actual emission reductions realised. Such provisions could also be seen as a conservative safety valve, helping to ensure that only credits are issued that are truly realised and additional to the baseline.

Even without such provisions however, and thus in the situation that during the crediting period the projects do not contribute to reaching the non-ETS targets, at least some of the projects will contribute to future commitments in the non-ETS sector by creating reductions well beyond the crediting period. Typical crediting periods for project based mechanisms do not exceed ten years and domestic offsetting could therefore definitely contribute to longer term (2030 and/or 2050) commitments for the Netherlands. In this context, it is important to note that existing and intended policies are not sufficient to reach the conditional pledge of 40% emission reduction in the Netherlands in 2030 compared to 1990. However, before concluding that for this reason, domestic offsetting is an attractive policy option to consider, domestic offsetting should at least be compared to other possible policy instruments to tap the available non-ETS emission reductions potential, an analysis beyond the scope of the present study. Such an analysis should ideally also shed further light on the exact barriers that prevent some of the cost-effective options identified from being implemented and the likelihood that domestic offsetting is likely to overcome these apparently non-financial barriers in comparison to other possible instruments.

Domestic offsetting as a means to involve the private sector?

A domestic offsetting scheme could incentivise the involvement of the private sector in domestic emission reductions (and potentially re-direct investments that are now made abroad), which could, in turn, stimulate innovation, create jobs, create exportable skills and technologies. Innovation in its turn could lead to an increase of emission reduction possibilities[32].
Secondly, domestic offsetting could also function as a search mechanism to private sector players to find niches of emission reductions that may have been overlooked so far.
Thirdly, it stimulates further engagement of the private sector in the wider climate change agenda. Project examples in Germany show that companies are using domestic offsetting as a marketing instrument: domestic reduction projects far below private profitability thresholds are accepted in return of the claim that the company has locally invested in fighting climate change.
All this being true, it is clear from the analysis in this report that these advantages only relate to a relatively small emission reduction potential. It remains questionable whether a domestic offsetting scheme would trigger the private sector to such an extent that apparent barriers towards the realisation of the various reduction options would be overcome, regardless of the exact design characteristics of such a scheme. To shed further light on this issue, we would recommend to further study these existing barriers in more detail, in connection with an overarching study that compares the cost-effectiveness of different policy options with each other.

[32] See also p.9 of "Kosten en baten van CO2-emissiereductie maatregelen", ECN/SEO (2012). Available at: http://www.ecn.nl/docs/library/report/2012/e12008.pdf.

Advantages and disadvantages of the three design options studied

To further understand the specific merits and drawbacks of domestic offsetting, it is important to consider the various design options in more detail. A domestic offset scheme, developed domestically as a **government buyer approach** is best suited to be designed in line with specific goals, e.g. to target specific sectors or mitigation options. Targeting such specific sectors would be more difficult in the Article 24a and voluntary market option, because the first is established at European level making it at least uncertain whether a country can set certain priorities by only allowing certain project types. For the voluntary market option, prioritizing certain sectors might be possible to some extent but only within the limits of the requirements of the voluntary carbon standard used. Drawback of the government buyer approach is however, that setting up such a scheme domestically comes with high up-front costs, because all modalities and procedures need to be developed first (see previous section). So, the freedom to tailor the scheme to specific needs comes with significant costs. Another pitfall of the government buyer option is that it is dependent on the not yet existing AEA trade. In this option the government is advised to finance the scheme by trading AEAs that are superfluous thanks to (additional) emissions reductions generated by the scheme. However, most Member States will most likely have sufficient Emission Units (EUAs, AEAs and possible other units from flexible mechanisms) to cover their emission targets. This would imply that future demand for AEAs is low while supply could be significant, causing AEA prices to decline. This will be further elaborated in the EEA's trends and projection report 2012 on Greenhouse gas emissions in the EU (publication: October 2012).

The **voluntary market option** has the advantage that the Netherlands can implement it more easily and independently of other countries' considerations. Also, the voluntary market is relatively well-established and stable (see Chapter 2)[33]. Furthermore it responds to the wish observed by some stakeholders to offset emissions via the voluntary market with domestic rather than international projects. Finally, and from a climate-perspective perhaps the most important advantage is that the voluntary market design option accomplishes a global net mitigation effect. This is because voluntary carbon offsets are not used in any capped compliance market (so in theory should not lead to an increase of emissions) while the cancellation of AEAs, which is in our view essential for the credibility of this design option, de facto decreases the overall emissions cap of the Netherlands. Despite these advantages, it is important to realise that in the voluntary market option, a prerequisite is that the type of projects allowed pass the test of additionality, according to the conditions set by the government. The reason for this is that AEAs represent a financial value, and cancellation of AEAs is therefore a delicate issue that can only be done if the government is convinced that real emissions reductions have taken place, which become visible in the national GHG inventory. Another condition is that up-front investment be discussed with the relevant voluntary standards, as well as the possibility to have voluntary projects in capped countries under the subsequent cancellation of AEAs.

[33] Although large scale application of voluntary projects in Annex I countries could influence the demand and supply balance on this market, the exact demand for domestic projects in the voluntary market is something that needs more detailed research.

The **Article 24a option** also offers the certainty of an existing market, the ETS market. It provides ETS installations with possibilities to comply with their ETS targets by reducing emissions in non-ETS sectors, which might be more cost-effective than reducing emissions within the EU-ETS (depending on the costs of the reduction options). Whether the price of EUAs will be influenced by domestic offsetting projects depends on whether the current possibilities to comply with non-EUA allowances (i.e. by using CDM/JI credits) are widened or not.
This option has the disadvantage that reduction measures that have a clear interaction with the EU-ETS (e.g. heat pumps, small-scale CHPs) will most likely be excluded from the scheme, in order to prevent market distortion.

This option also has the weakness that the framework needs to be established by the European Commission which may take years (or may even never take place) and is a process with multiple EU stakeholders of which NL is a relatively small one. This could be seen as an advantage, as some administration costs would pass to the European Commission rather than the Dutch government, but it also reduces the autonomy of the Dutch government to manage the scope and modalities of the scheme. It also means that buyers within the EU might be more likely to purchase reductions from projects in parts of Europe with cheaper non-ETS abatement options than those found in the Netherlands. This offers the risk that the Netherlands has to carry administration costs, while emission reductions take place elsewhere. Based on the relatively low potential available in the Netherlands, it is questionable whether actively pursuing the Article 24a option in Europe is a logical choice for the Netherlands at this moment.

7 Conclusion

The central research question in this study is whether domestic offsetting could be a cost-effective policy instrument to achieve emission reductions in the non-ETS sectors in the Netherlands and if so, which domestic offsetting design options are most likely to do so. We start from the principle that only emission reductions which are additional to those that already take place under existing policies for the non-ETS sector should be eligible for a domestic offsetting scheme. Also the reductions should be realisable by private sector parties. Using these filters, we estimate the maximum emission reduction potential that can be achieved with a domestic offsetting scheme in the Netherlands to be in the range of 0.5 – 1.0 $MtCO_2$. This estimate also takes into account barriers related to transactions costs. Furthermore it takes into account the possibility and costs of establishing baselines and monitoring methodologies on project level, essential to ensure that only real additional reductions are credited under the scheme. Experiences in other countries confirm that the volume of reductions achieved by domestic offsetting schemes is often limited, especially taking into account that most significant point sources of emissions (e.g. N_2O point sources) are already included in the EU ETS and as such are not available for a future domestic offsetting scheme in the Netherlands. A more accurate estimate of the reduction potential in the relevant sectors for a domestic offsetting scheme would require a more detailed analysis of the existing financial and non-financial barriers that exist for the reduction options identified in this study and the likelihood that the financial incentive of a domestic offsetting scheme would overcome these barriers.

Tapping the potential via a domestic offsetting scheme will, based on the assumptions, not directly contribute in the short term to reaching the non-ETS targets of the Netherlands in any of the design options assessed in this study. This is because in all options the resulting credits are used for compliance in the ETS market (Art. 24a option), are sold to other countries (government buyer option) or are sold in the voluntary market (voluntary market option) under the cancellation of an equivalent amount of assigned units to the Netherlands, which is essential to avoid double-counting of the emission reductions. Opportunities to ensure a positive contribution to the Dutch non-ETS targets in the short term exist, but are not discussed in this study.
Beyond the crediting period of the projects (typically no longer than 10 years), domestic offsetting could however contribute to the long term (2030 or 2050) commitments of the Netherlands and could incentivise innovation and the involvement of the private sector in domestic emission reductions.

Harvesting the limited reduction potential via domestic offsetting comes with significant up-front and continuous administrative costs for the government to run the scheme. We estimate these costs to be between € 250,000 and € 1,500,000 annually depending on the exact characteristics of the scheme and depending on the level to which existing modalities and procedures from existing project based mechanisms (CDM, JI, and voluntary market) are used. These costs are related to starting up and managing the scheme and to ensuring that only additional projects take place under it with monitored reductions that are reflected in national monitoring methodologies.

We did not compare domestic offsetting with other possible policy instruments to target emission reductions in the non-ETS sectors in view of longer term commitments; we recommend this to be a subject of further study.

Pros and cons of the three design options studied have been discussed extensively in Chapter 6.4. From this analysis we conclude that the government buyer option is not recommended due to the high up-front costs and the dependence on the not yet existing trade in AEAs.
From the two remaining options the voluntary market option has more advantages than the Article 24a option. The administrative costs to the government are in the same order of magnitude for both options. Although large scale application of voluntary projects in Annex I countries could influence the demand and supply balance on this market, the exact demand for domestic projects in the voluntary market is something that needs more detailed research.

In conclusion, the realistic emission reduction potential which could be tapped by domestic offsetting in the Netherlands is smaller than 1% of current non-ETS emissions. Regardless of the design choice, a domestic offsetting scheme does in principle not directly contribute to reaching the non-ETS targets of the Netherlands in the short term. Whether it is a suitable policy instrument in the longer term (2030 and beyond) is a question we recommend to be further studied in comparison with other policy options and in relation to the barriers that prevent existing cost-effective reduction potentials from being realised.

Appendix 1: MAC curves and corresponding tables

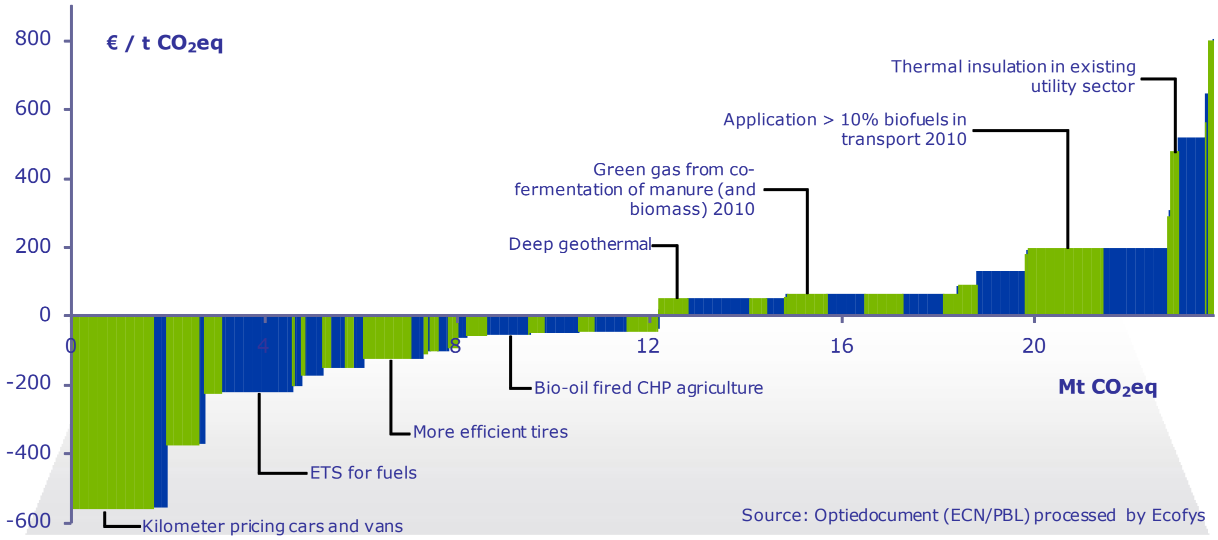


Figure 12: MAC curve total non-ETS potential in 2020 in the Netherlands from an end-users perspective

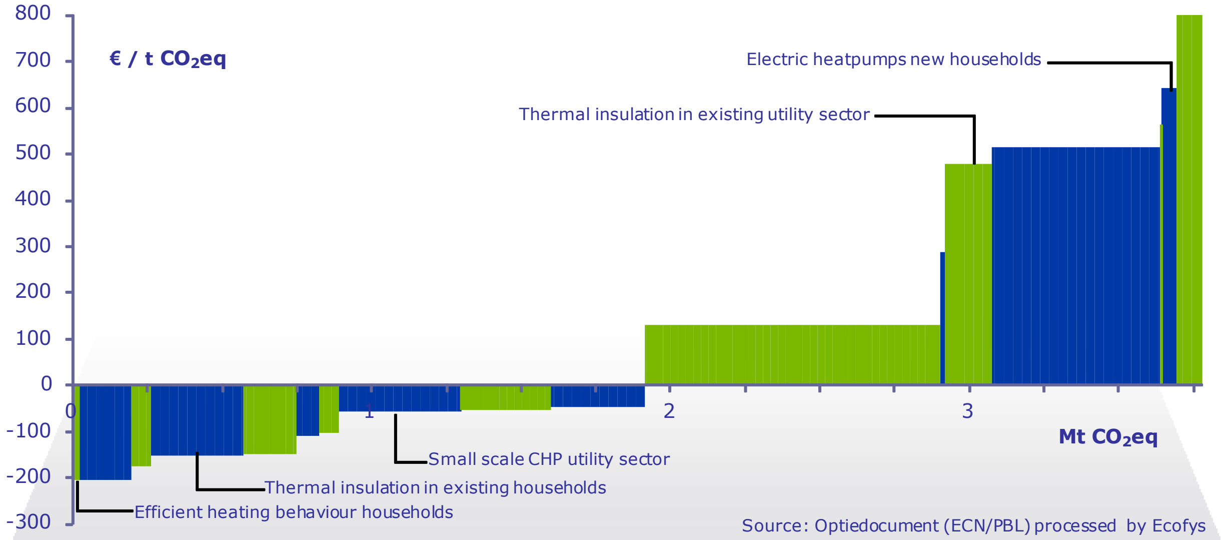


Figure 13: MAC curve built environment sector in 2020 in the Netherlands from an end-users perspective

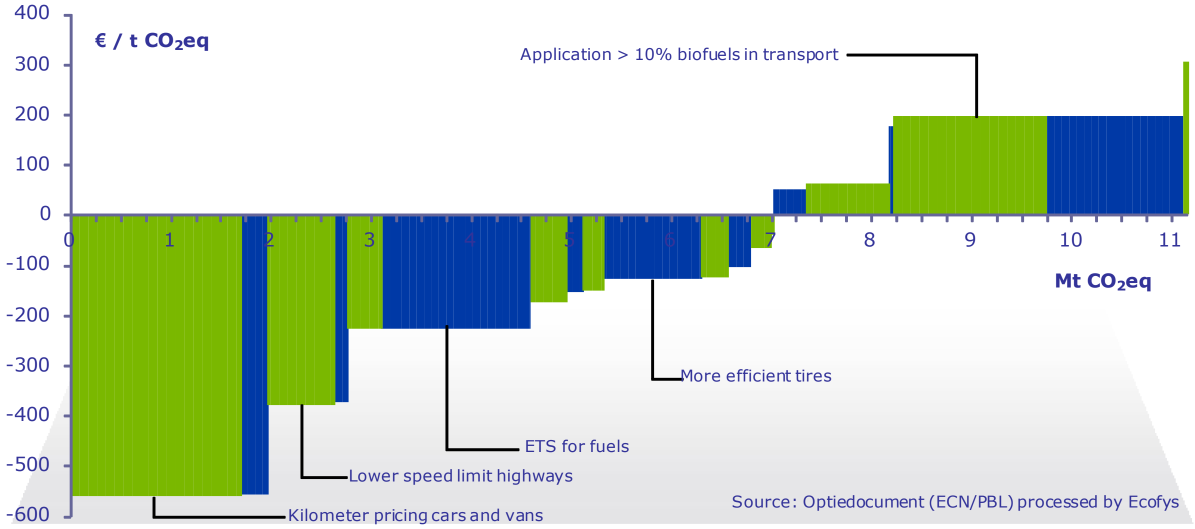


Figure 14: MAC curve transport sector in 2020 in the Netherlands from an end-users perspective

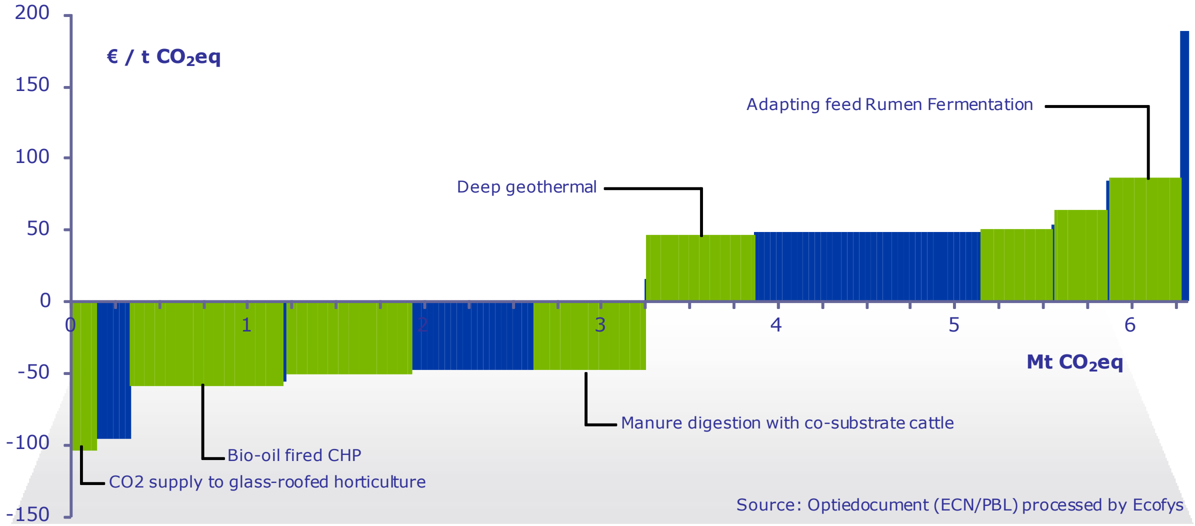


Figure 15: MAC curve agri- and horticultural sector in 2020 in the Netherlands from an end-users perspective

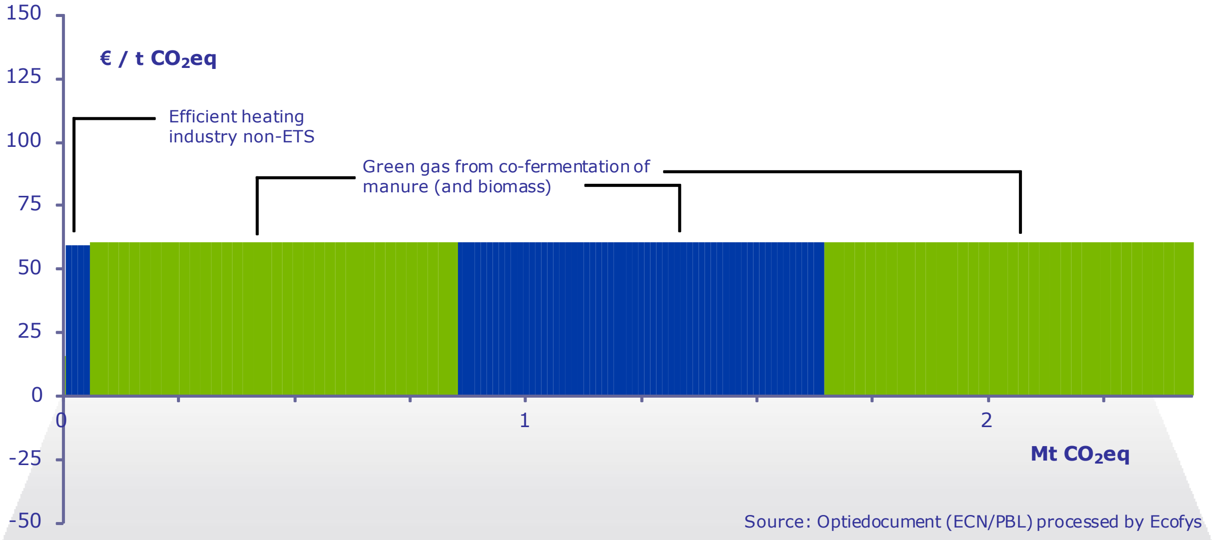


Figure 16: MAC curve "others" sector in 2020 in the Netherlands from an end-users perspective

Table 9: Overview of characteristics of all non-ETS reduction measures (part 1 of 2)

Option	Sector	Net reduction (MtCO2)	Cum reduction (MtCO2)	Cost effect. social (€/tCO2)	Cost effect. end-user (€/tCO2)	Costs (mln €)	Below 30 €/tCO2	Not gov-only	Additional	Result
Kilometer pricing cars and vans	Transport	1.712	1.7	-84.6	-563.0	-144.8	1	0	1	0
Increased fuel excise duty	Transport	0.259	2.0	-335.5	-560.0	-87.0	1	0	1	0
Lower speed limit highways	Transport	0.670	2.6	-134.8	-379.0	-90.4	1	0	1	0
Lower speed limit highways	Transport	0.126	2.8	-131.4	-375.0	-16.6	1	0	1	0
CO2 standard vans	Transport	0.336	3.1	-55.9	-229.0	-18.8	1	1	1	1
ETS for fuels	Transport	1.491	4.6	10.8	-227.0	16.1	1	0	1	0
Efficient heating behaviour households	Built environment	0.021	4.6	-95.0	-207.0	-1.9	1	1	1	1
Efficient heating behaviour households	Built environment	0.176	4.8	-95.0	-207.0	-16.7	1	1	1	1
Utilization of waste heat in households	Built environment	0.064	4.9	-64.7	-177.0	-4.1	1	1	1	1
Lowering tax-free compensation business travel	Transport	0.363	5.2	93.2	-177.0	33.9	1	0	0	0
Kerosine excise duty	Transport	0.166	5.4	-119.2	-156.0	-19.8	1	0	1	0
Thermal insulation in existing households	Built environment	0.313	5.7	-50.6	-155.0	-15.8	1	1	1	1
Utilization of waste heat in households	Built environment	0.175	5.9	-29.7	-153.0	-5.2	1	1	1	1
CO2 standard vans	Transport	0.204	6.1	111.0	-153.0	22.7	1	1	1	1
More efficient tires	Transport	0.981	7.1	106.9	-128.0	104.8	1	1	1	1
More efficient tires	Transport	0.262	7.3	112.3	-127.0	29.4	1	1	1	1
Heatpumps in utility sector	Built environment	0.079	7.4	-69.0	-113.0	-5.4	1	1	1	1
Heatpumps in utility sector	Built environment	0.062	7.5	-72.3	-107.0	-4.5	1	1	1	1
CO2 supply to glass-roofed horticulture	Agri- and horticulture	0.146	7.6	-70.9	-105.0	-10.4	1	1	0	0
Kilometer pricing trucks	Transport	0.228	7.8	225.0	-105.0	51.3	1	0	1	0
CO2 supply to glass-roofed horticulture	Agri- and horticulture	0.194	8.0	-57.8	-97.2	-11.2	1	1	0	0
CO2 standard trucks	Transport	0.200	8.2	78.2	-66.6	15.7	1	1	1	1
Small scale CHP utility sector	Built environment	0.412	8.6	18.3	-60.4	7.6	1	1	1	1
Bio-oil fired CHP agriculture	Agri- and horticulture	0.862	9.5	102.6	-59.4	88.5	1	1	0	0
Small scale CHP agriculture	Agri- and horticulture	0.019	9.5	3.6	-56.8	0.1	1	1	0	0
CO2 standard vans	Transport	0.008	9.5	213.5	-56.2	1.7	1	1	1	1
Small scale CHP utility sector	Built environment	0.301	9.8	31.3	-54.6	9.4	1	1	1	1
Small scale CHP agriculture	Agri- and horticulture	0.705	10.5	7.9	-51.3	5.6	1	1	0	0
Small scale CHP utility sector	Built environment	0.316	10.8	38.3	-49.2	12.1	1	1	1	1
Small scale CHP agriculture	Agri- and horticulture	0.696	11.5	13.2	-48.2	9.2	1	1	0	0
Manure digestion with co-substrate cattle farms	Agri- and horticulture	0.633	12.2	159.0	-48.2	100.6	1	1	1	1
CO2 standard vans	Transport	0.023	12.2	271.4	-42.0	6.2	1	1	1	1

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Table 10: Overview of characteristics of all non-ETS reduction measures (part 2 of 2)

Option	Sector	Net reduction (MtCO2)	Cum reduction (MtCO2)	Cost effect. social (€/tCO2)	Cost effect. end-user (€/tCO2)	Costs (mln €)	Below 30 €/tCO2	Not gov-only	Additional	Result
Reduced heat demand agriculture	Agri- and horticulture	0.002	12.2	132.1	14.5	0.3	1	1	1	1
Reduced heat demand industry non-ETS	Others	0.005	12.2	16.4	15.0	0.1	1	1	1	1
Deep geothermal	Agri- and horticulture	0.614	12.8	46.1	46.1	28.3	0	1	1	0
Deep geothermal	Agri- and horticulture	1.279	14.1	44.7	47.3	57.2	0	1	1	0
CO2 standard cars	Transport	0.329	14.4	270.2	48.4	88.9	0	1	1	0
Less nitrogen fertilizers	Agri- and horticulture	0.400	14.8	50.0	50.0	20.0	0	1	1	0
Reduced heat demand agriculture	Agri- and horticulture	0.016	14.8	177.5	52.3	2.8	0	1	1	0
Efficient heating industry non-ETS	Others	0.053	14.9	56.4	59.1	3.0	0	1	1	0
Green gas from co-fermentation of manure (and biomass)	Others	0.795	15.7	207.8	59.9	165.3	0	1	1	0
Green gas from co-fermentation of manure (and biomass)	Others	0.795	16.5	207.9	59.9	165.3	0	1	1	0
Green gas from co-fermentation of manure (and biomass)	Others	0.795	17.3	207.9	59.9	165.3	0	1	1	0
CO2 standard cars	Transport	0.830	18.1	272.3	60.8	225.9	0	1	1	0
Change of cattle feed	Agri- and horticulture	0.300	18.4	63.0	63.0	18.9	0	1	1	0
Reduced heat demand agriculture	Agri- and horticulture	0.014	18.4	247.4	83.7	3.5	0	1	1	0
Change of cattle feed	Agri- and horticulture	0.400	18.8	85.7	85.7	34.3	0	1	1	0
Thermal insulation in existing households	Built environment	0.991	19.8	269.7	128.0	267.2	0	n/a	n/a	0
Hybrid busses	Transport	0.034	19.9	278.4	175.0	9.3	0	n/a	n/a	0
Biomass-fired boilers	Agri- and horticulture	0.042	19.9	116.1	188.0	4.9	0	n/a	n/a	0
Application > 10% biofuels in transport	Transport	1.536	21.4	168.2	195.0	258.3	0	n/a	n/a	0
Application > 10% biofuels in transport	Transport	1.359	22.8	168.2	195.0	228.6	0	n/a	n/a	0
Heatpumps in utility buildings	Built environment	0.018	22.8	188.4	285.0	3.4	0	n/a	n/a	0
Hybrid busses	Transport	0.049	22.9	457.5	304.0	22.4	0	n/a	n/a	0
Thermal insulation in utility buildings	Built environment	0.154	23.0	350.8	476.0	54.1	0	n/a	n/a	0
Thermal insulation in utility buildings	Built environment	0.565	23.6	383.5	513.0	216.8	0	n/a	n/a	0
Heatpumps in utility buildings	Built environment	0.006	23.6	617.0	561.0	3.8	0	n/a	n/a	0
Heatpumps in new buildings	Built environment	0.049	23.6	504.9	641.0	24.8	0	n/a	n/a	0
Heatpumps in new buildings	Built environment	0.086	23.7	632.1	796.0	54.0	0	n/a	n/a	0
Additional SCR stationary gas engines,	Agri- and horticulture	0.014	23.7	800.2	800.2	11.4	0	n/a	n/a	0

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Table 11: Overview of characteristics of all non-ETS reduction measures within the built environment sector

Option	Sector	Net reduction (MtCO2)	Cum reduction (MtCO2)	Cost effect. social (€/tCO2)	Cost effect. end-user (€/tCO2)	Costs (mln €)	Below 30 €/tCO2	Not gov-only	Additional	Result
Efficient heating behaviour households	Built environment	0.021	4.6	-95.0	-207.0	-1.9	1	1	1	1
Efficient heating behaviour households	Built environment	0.176	4.8	-95.0	-207.0	-16.7	1	1	1	1
Utilization of waste heat in households	Built environment	0.064	4.9	-64.7	-177.0	-4.1	1	1	1	1
Thermal insulation in existing households	Built environment	0.313	5.7	-50.6	-155.0	-15.8	1	1	1	1
Utilization of waste heat in households	Built environment	0.175	5.9	-29.7	-153.0	-5.2	1	1	1	1
Heatpumps in utility sector	Built environment	0.079	7.4	-69.0	-113.0	-5.4	1	1	1	1
Heatpumps in utility sector	Built environment	0.062	7.5	-72.3	-107.0	-4.5	1	1	1	1
Small scale CHP utility sector	Built environment	0.412	8.6	18.3	-60.4	7.6	1	1	1	1
Small scale CHP utility sector	Built environment	0.301	9.8	31.3	-54.6	9.4	1	1	1	1
Small scale CHP utility sector	Built environment	0.316	10.8	38.3	-49.2	12.1	1	1	1	1
Thermal insulation in existing households	Built environment	0.991	19.8	269.7	128.0	267.2	0	n/a	n/a	0
Heatpumps in utility buildings	Built environment	0.018	22.8	188.4	285.0	3.4	0	n/a	n/a	0
Thermal insulation in utility buildings	Built environment	0.154	23.0	350.8	476.0	54.1	0	n/a	n/a	0
Thermal insulation in utility buildings	Built environment	0.565	23.6	383.5	513.0	216.8	0	n/a	n/a	0
Heatpumps in utility buildings	Built environment	0.006	23.6	617.0	561.0	3.8	0	n/a	n/a	0
Heatpumps in new buildings	Built environment	0.049	23.6	504.9	641.0	24.8	0	n/a	n/a	0
Heatpumps in new buildings	Built environment	0.086	23.7	632.1	796.0	54.0	0	n/a	n/a	0

Table 12: Overview of characteristics of all non-ETS reduction measures within the transport sector

Option	Sector	Net reduction (MtCO2)	Cum reduction (MtCO2)	Cost effect. social (€/tCO2)	Cost effect. end-user (€/tCO2)	Costs (mln €)	Below 30 €/tCO2	Not gov-only	Additional	Result
Kilometer pricing cars and vans	Transport	1.712	1.7	-84.6	-563.0	-144.8	1	0	1	0
Increased fuel excise duty	Transport	0.259	2.0	-335.5	-560.0	-87.0	1	0	1	0
Lower speed limit highways	Transport	0.670	2.6	-134.8	-379.0	-90.4	1	0	1	0
Lower speed limit highways	Transport	0.126	2.8	-131.4	-375.0	-16.6	1	0	1	0
CO2 standard vans	Transport	0.336	3.1	-55.9	-229.0	-18.8	1	1	1	1
ETS for fuels	Transport	1.491	4.6	10.8	-227.0	16.1	1	0	1	0
Lowering tax-free compensation business travel	Transport	0.363	5.2	93.2	-177.0	33.9	1	0	0	0
Kerosine excise duty	Transport	0.166	5.4	-119.2	-156.0	-19.8	1	0	1	0
CO2 standard vans	Transport	0.204	6.1	111.0	-153.0	22.7	1	1	1	1
More efficient tires	Transport	0.981	7.1	106.9	-128.0	104.8	1	1	1	1
More efficient tires	Transport	0.262	7.3	112.3	-127.0	29.4	1	1	1	1
Kilometer pricing trucks	Transport	0.228	7.8	225.0	-105.0	51.3	1	0	1	0
CO2 standard trucks	Transport	0.200	8.2	78.2	-66.6	15.7	1	1	1	1
CO2 standard vans	Transport	0.008	9.5	213.5	-56.2	1.7	1	1	1	1
CO2 standard vans	Transport	0.023	12.2	271.4	-42.0	6.2	1	1	1	1
CO2 standard cars	Transport	0.329	14.4	270.2	48.4	88.9	0	1	1	0
CO2 standard cars	Transport	0.830	18.1	272.3	60.8	225.9	0	1	1	0
Hybrid busses	Transport	0.034	19.9	278.4	175.0	9.3	0	n/a	n/a	0
Application > 10% biofuels in transport	Transport	1.536	21.4	168.2	195.0	258.3	0	n/a	n/a	0
Application > 10% biofuels in transport	Transport	1.359	22.8	168.2	195.0	228.6	0	n/a	n/a	0
Hybrid busses	Transport	0.049	22.9	457.5	304.0	22.4	0	n/a	n/a	0

Table 13: Overview of characteristics of all non-ETS reduction measures within the agri- and horticultural sector

Option	Sector	Net reduction (MtCO2)	Cum reduction (MtCO2)	Cost effect. social (€/tCO2)	Cost effect. end-user (€/tCO2)	Costs (mln €)	Below 30 €/tCO2	Not gov-only	Additional	Result
CO2 supply to glass-roofed horticulture	Agri- and horticulture	0.146	7.6	-70.9	-105.0	-10.4	1	1	0	0
CO2 supply to glass-roofed horticulture	Agri- and horticulture	0.194	8.0	-57.8	-97.2	-11.2	1	1	0	0
Bio-oil fired CHP agriculture	Agri- and horticulture	0.862	9.5	102.6	-59.4	88.5	1	1	0	0
Small scale CHP agriculture	Agri- and horticulture	0.019	9.5	3.6	-56.8	0.1	1	1	0	0
Small scale CHP agriculture	Agri- and horticulture	0.705	10.5	7.9	-51.3	5.6	1	1	0	0
Small scale CHP agriculture	Agri- and horticulture	0.696	11.5	13.2	-48.2	9.2	1	1	0	0
Manure digestion with co-substrate cattle farms	Agri- and horticulture	0.633	12.2	159.0	-48.2	100.6	1	1	1	1
Reduced heat demand agriculture	Agri- and horticulture	0.002	12.2	132.1	14.5	0.3	1	1	1	1
Deep geothermal	Agri- and horticulture	0.614	12.8	46.1	46.1	28.3	0	1	1	0
Deep geothermal	Agri- and horticulture	1.279	14.1	44.7	47.3	57.2	0	1	1	0
Less nitrogen fertilizers	Agri- and horticulture	0.400	14.8	50.0	50.0	20.0	0	1	1	0
Reduced heat demand agriculture	Agri- and horticulture	0.016	14.8	177.5	52.3	2.8	0	1	1	0
Change of cattle feed	Agri- and horticulture	0.300	18.4	63.0	63.0	18.9	0	1	1	0
Reduced heat demand agriculture	Agri- and horticulture	0.014	18.4	247.4	83.7	3.5	0	1	1	0
Change of cattle feed	Agri- and horticulture	0.400	18.8	85.7	85.7	34.3	0	1	1	0
Biomass-fired boilers	Agri- and horticulture	0.042	19.9	116.1	188.0	4.9	0	n/a	n/a	0
Additional SCR stationary gas engines,	Agri- and horticulture	0.014	23.7	800.2	800.2	11.4	0	n/a	n/a	0

Table 14: Overview of characteristics of all non-ETS reduction measures within the "others" sector

Option	Sector	Net reduction (MtCO2)	Cum reduction (MtCO2)	Cost effect. social (€/tCO2)	Cost effect. end-user (€/tCO2)	Costs (mln €)	Below 30 €/tCO2	Not gov-only	Additional	Result
Reduced heat demand industry non-ETS	Others	0.005	12.208	16.4	15	0.089	1	1	1	1
Efficient heating industry non-ETS	Others	0.053	14.899	56.36	59.1	2.981	0	1	1	0
Green gas from co-fermentation of manure (and biomass)	Others	0.795	15.695	207.84	59.9	165.295	0	1	1	0
Green gas from co-fermentation of manure (and biomass)	Others	0.795	16.490	207.93	59.9	165.263	0	1	1	0
Green gas from co-fermentation of manure (and biomass)	Others	0.795	17.284	207.93	59.9	165.263	0	1	1	0

Appendix 2: Technical questions and answers

During a limited stakeholder consultation, the following technical questions have been raised by stakeholders and answered by Ecofys (in Dutch).

Commentaren en reactie

Commentaar	Categorie	Reactie Ecofys	Voorgestelde actie
Het rapport wijst terecht op de beperking dat DO-projecten de Nederlandse overheid niet dichter brengen bij het halen van het doel volgens de Effort Sharing Decision (d.w.z. de emissiereductie van een DO project komt naar voren in de NL emissieinventarisatie, maar dit gaat gepaard met overdracht van corresponderende AEAs naar de lidstaat waar de DO-credits naar toe gaan. Hierdoor komt NL per saldo niet dichter bij de Effort Sharing-doelstelling). Het rapport wijst er echter ook op dat waar de credit-overdracht slechts geldt voor de DO-projectduur, de emissiereductie van DO-projectinvestering duurzaam is en na afloop van de credit-tijd van het project volledig naar NL toevloeit. Dit had wel krachtiger mogen worden aangezet.	Baten	De lange termijn voordelen van DO staan in het rapport duidelijk benoemd, maar zijn niet conclusie en samenvatting opgenomen.	We zullen nagaan hoe de (lange termijn) voordelen van DO in het rapport duidelijker naar voren kunnen komen.
In het recente ECN/SEO-rapport "kosten en baten van CO2-reductiemaatregelen" staat het onderstaande, [...] zou ook niet in het Ecofys-rapport moeten worden opgenomen dat DO's bijdragen aan deze vrijheidsgraden en de creativiteit/innovatie bevorderen? Het voordeel van een marktgebaseerd systeem is immers dat de markt kansen ziet en nieuwe oplossingen bedenkt	Baten	Dit staat in het rapport. Zie p.50: "A domestic offsetting scheme could incentivise the involvement of the private sector in domestic emission reductions (and potentially re-direct investments that are now made abroad), which could, in turn, stimulate innovation, create jobs, create exportable skills and technologies."	Referentie naar ECN / SEO rapport opnemen in rapport.
Er is gezegd dat DO niet nodig is voor de NL 20% CO2-doelstelling. Dat is een beperkte benadering. DO leidt wel tot lagere emissietrends, energiebesparing en strengere doelen.	Baten	De secundaire voordelen van DO op het gebied van innovatie etc worden in het rapport benoemd (p50). DO kan weliswaar in NL leiden tot minder emissies, maar draagt in principe niet bij aan de overheidsdoelstellingen op de korte termijn, omdat de overheid de doelstellingen moet aanscherpen door AEAs in te leveren. In 2 van de 3 onderzochte DO-opties leidt DO globaal ook niet tot minder uitstoot op korte termijn (reducties in NL mogen elders tot meer emissies leiden). Wij onderschrijven dat op langere termijn (>10jr) DO een bijdrage zou kunnen leveren aan lagere emissietrends, maar het is onduidelijk hoe groot deze bijdrage zou zijn. Uit ons onderzoek blijkt wel dat de bijdrage tot 2020 relatief gering is, gezien het lage potentieel. DO kan ook tot energiebesparing leiden. Er zijn onvoldoende gegevens beschilkbaar om dit neveneffect in het kader van dit onderzoek te kwantificeren.	Geen
Er is bij ETS-bedrijven juist groeiende interesse om NL CO2-credits te kopen, i.p.v uit buitenland	Baten	Wij zijn bekend met voorbeelden uit Duitsland en horen graag enkele voorbeelden in NL. Wij zijn benieuwd of alleen ETS-bedrijven deze interesse hebben, of ook niet-ETS bedrijven.	Rapport indien mogelijk aanvullen met voorbeelden van Nederlandse vraag naar NL rechten.
Wat ik mis is innovatie. De reden waarom je DO wilt is dat je met bestaand beleid een deel van de emissiereductieopties moeilijk kunt bereiken en dat je de markt het werk wilt laten doen (zie voorbeeld van Frankrijk: we doen wat we kunnen en gebruiken DO voor moeilijke sectoren). Het rapport gaat eigenlijk niet op die redenen in. Dit zou verder moeten worden ontwikkeld en dito gedetailleerd en past heel goed in de ontwikkeling van een financieringsstrategie om energie innovaties echt te stuwen.	Baten	In het rapport gaan we uitgebreid in op dit punt, zie par. 6.4 (discussion of pros and cons).	Geen
Er wordt aangegeven dat de overheidskosten per jaar 250.000 kunnen zijn: is er ook gekeken om de certificaat-uitgifte budgetneutraal te doen (projectpartijen bepalen dan leges)	Kosten	Deze varianten zijn niet apart onderzocht. Door leges kunnen de kosten voor de overheid omlaag maar nemen de transactiekosten voor marktpartijen toe, waardoor een deel van de financiele prikkel van dit beleidsinstrument verdampt. Het is in het kader van dit onderzoek niet te bepalen welke impact dit zal hebben op de behaalde reducties.	In rapport deze variant benoemen met pro (minder kosten) en con (minder potentieel).
Transactiekosten en administratie-kosten kunnen lager zijn dan aangeven, d.m.v. programma'e en bundeling en de administratie die als aanwezig is bijv. via Energielabel en BREEAM	Kosten	Transactiekosten kunnen inderdaad lager worden door programma's, dit staat in het rapport (p41). Of de administratiekosten daardoor per saldo afnemen is nog maar de vraag.	Geen
Ook de ESCO-aanpak is een geschikte, kostenbesparende aanpak in de bouwsector.	Kosten	De ESCO methode is volgens ons nog niet toegepast in domestic offsetting projecten. Of de ESCO-methodiek voor het bepalen van baseline en emissiereducties compatibel is met de strenge voorwaarden die de Nederlandse overheid hieraan stelt, valt te betwijfelen en zou nader onderzocht moeten worden. Het is daarnaast de vraag of ESCO's het uitgangspunt van additionaliteit geweld aandoen (vanwege financiele die ESCO's bieden). Kortom, of dit een geschikte aanpak is is zeer de vraag.	Geen
Klopt het dat slechts één bron is gebruikt: het PBL-optiedocument?	Methodiek	Ja. Het is van belang dat de reductiepotentielen op nationaal niveau en op consistente wijze zijn berekend. Het ECN / PBL optiedocument is de enige bron die dit doet.	Geen
Er is nu top-down gekeken naar bekende opties, die zijn afgepeld tot het uiteindelijk potentieel. Is er daarnaast ook bottom-up geinventariseerd of er andere opties denkbaar zijn? Is er bijvoorbeeld gesproken met spelers in kansrijke sectoren?	Methodiek	Mochten er andere opties denkbaar zijn, dan is het van belang dat deze met dezelfde aannames (energiescenarios, referentieperiode, etc) worden meegenomen als de potentielen uit het Optiedocument. Deze werkzaamheden (inventarisatie, berekeningen) lagen buiten het bereik van deze studie.	Geen
De grens van 30 Euro per ton is niet essentieel: CO2 waarde creatie is een onderdeel van de hele financiering, maar wel een waardevolle externe kasstroom.	Methodiek	Wij hebben in het onderzoek gekeken naar de opties boven de 30 eur / ton, om de hiernaast genoemde reden. Wat opvalt is dat tussen de 30 en 45 E / ton geen extra besparingsopties beschikbaar zijn. Vanaf deze grens zit je met opties die ruim 4 keer de huidige CO2 prijs kosten en dus voor 75 % onredabel zijn (vanuit CO2 oogpunt).	Geen
Het rapport is beperkend door uit te gaan van een geschatte toekomstige CO2 marktprijs van 30 euro en te veronderstellen dat alleen die projecten interessant zijn die volgens ECN's marginale kostencurves per ton CO2-reductie goedkoper zijn dan 30 euro. In eerdere studies (Energy Valley en VROM) toonden we echter berekeningen van projecten waarbij de CO2-reductiewaarde weliswaar niet de gehele, maar wel een groot deel van de onrendabele top van projecten afdekten. Wat je nog te kort kwam voor een rendabel project kon dan worden aangevuld met bestaande stimuleringsmaatregelen. Hierdoor had je minder druk op bestaande potjes en/of kon je bestaande potjes breder inzetten. Die mogelijke combinatie van politieke instrumenten wordt door het rapport niet belicht. Met andere woorden: hoe ziet het plaatje eruit bij duurdere opties waarbij je de CO2-markt eerst de onrendabele top laat opeten, aangevuld waar nodig door bestaande maatregelen. Dit aspect moet zeker verder worden onderzocht en gedetailleerd. We zien hier nadrukkelijke kansen.	Methodiek	Wij hebben in het onderzoek gekeken naar de opties boven de 30 eur / ton, om de hiernaast genoemde reden. Wat opvalt is dat tussen de 30 en 45 E / ton geen extra besparingsopties beschikbaar zijn. Vanaf de 45 E / ton grens zit je met opties die ruim vier keer de huidige CO2 prijs kosten en dus slechts voor 75 % onredabel zijn (vanuit CO2 oogpunt). Bij combinatie met andere beleidsinstrumenten komt het additionaliteitsbeginsel mogelijk in het geding.	Geen

Commentaren en reactie

Commentaar	Categorie	Reactie Ecofys	Voorgestelde actie
Waarom komt het potentieel voor 'reduced heat demand industry non-ETS' (p.28) zo extreem laag uit? zit daar niet meer potentieel in dan 10.000 ton?	Potentieel	Het totale potentieel van deze maatregel is groter, maar valt duurder uit dan 30 EUR / tCO2 en is daarom niet meegenomen. Zie de overzichtstabel met besparingsopties in de bijlage van het rapport.	Geen
Wordt MJA3 gezien als beleid dat 'niet doorkruist' mag worden?	Potentieel	Met MJA3 (voor zover bekend in oktober 2009) is rekening gehouden in de berekening van de reductiepotentiëlen door ECN / PBL. MJA3 wordt (mede) gebruikt om te voldoen aan de verplichting voor bedrijven om energiebesparingsmaatregelen met een terugverdientijd van 5 jaar of minder (rendabele maatregelen) te nemen. In de raming gaat PBL/ECN ervan uit dat de MJA3 ertoe bijdraagt dat rendabele maatregelen eerder worden genomen en daaraan is effect aan de energie-efficiëntieverbetering toegekend. In ieder DO systeem als in het rapport beschreven is het, gezien de wettelijke verplichting tot het treffen van rendabele maatregelen, onaannemelijk dat rendabele maatregelen (de maatregelen die in MJA3 worden getroffen zijn grotendeels rendabele maatregelen) additioneel zijn.	Ecofys heeft dit punt nader onderzocht met als uitkomst het hiernaast geschrevene.
p.26: kan toegelicht worden hoe de verhouding ETS/non-ETS is in de 2,9 Mton die buiten beschouwing werd gelaten?	Potentieel	Er zijn drie opties weggefilterd: bio-olie WKK (1.2 Mton) wordt al gauw toegepast in grotere installaties die onder het ETS vallen. Biowarmte uit industriele reststromen (0,4 Mton) is naar inschatting voor 2/3 relevant voor ETS, 1/3 niet-ETS. Biomassa ketels voor industrie (1,3 Mton) kan in beide voorkomen. Over deze laatste optie valt te twisten, maar zeker is dat hij in het volgende filter over kosteneffectiviteit alsnog weg zou vallen.	Geen
Builddesk komt tot een jaarlijkse CO2-reductie via ESCOs van 1 Mton in kantoren, winkels en bedrijfspanden: is dat meegenomen?	Potentieel	Vermoedelijk neemt BuildDesk ook de indirecte emissiereducties mee ten gevolge van zuiniger verlichting; deze zijn in dit rapport niet meegenomen ivm het voorkomen van dubbeltelling met het ETS. Het kosteneffectieve besparingspotentieel in de utiliteitsbouw wordt door ECN / PBL op 1.2 MtCO2 geschat. Dat lijkt in dezelfde orde van grootte uit te komen als BuildDesk.	Geen
Gebruik restwarmte uit ETS, kan wel meegenomen worden bij nieuwbouw; dat voorkomt nieuwe ETS-emissie, bij vervangen gas voor warmte	Potentieel	Het gebruik van industriele restwarmte in huishoudens is meegenomen in de opties van ECN / PBL.	Geen
Gebruik restwarmte uit niet ETS bij voorkomen warmte door gas bij bestaande bouw kan wel meegenomen worden	Potentieel	Het gebruik van industriele restwarmte in huishoudens is meegenomen in de opties van ECN / PBL.	Geen
Gebruik van externe koeling (water) bij nieuwbouw kan meegenomen worden	Potentieel	Het gebruik van externe (duurzame) koeling verlaagt het elektriciteitsgebruik, wat niet voor DO in aanmerking kan komen (vanwege directe interactie met het ETS).	Geen
Gebruik van eigen small scale WKK, bio-WKK en energie-neutrale nieuwbouw kan wel meegenomen worden	Potentieel	WKK is een lastige optie vanwege de interactie met het ETS (via de elektriciteit). De genoemde WKK opties zijn waarschijnlijk niet meegenomen vanwege de relatief hoge kosten.	Geen
Bij koppeling van warmte of stroom uit mestvergisting kan de methaanreductie worden meegenomen; die valt niet onder DE-subsidie	Potentieel	Uit informatie van het ECN blijkt dat de vermeden methaanemissies meegenomen zijn in het optiedocument.	Geen
We zien zien dat de emissiereductie van de bouw (materialen e.d.) niet zijn meegenomen	Potentieel	Wij hebben niet scherp wat hier precies bedoelt wordt.	Geen
We zien ook kansen bij NL netto CO2-reductie als duurzame nieuwbouw gecombineerd wordt met sloop van bestaande 'inefficiente' bouw: ook dat zou een CO2-project via DO kunnen zijn	Potentieel	Deze optie zal duurder zijn dan het simpelweg neerzetten van duurzame nieuwbouw ivm de sloopkosten. Vermoedelijk staat deze optie daarom niet op de lijst. Daarnaast lijkt er bij dit idee overlap te zijn met andere maatregelen op de lijst (zoals Thermal insulation in existing households).	Geen
Begreep ik het goed dat groen gas niet als optie is opgenomen in de studie? Waarschijnlijk duurder dan euro 30/ton. Kan dit worden verduidelijkt?	Potentieel	Deze optie zit rond de 60 Eur / ton. De optie staat in de groslijst, zie tabel 10 in appendix van het rapport.	Geen

Glossary

Allocated Amount Units (AAUs) - A tradable unit corresponding to one tonne of carbon dioxide equivalent (1t CO_2e). Countries with quantified emission-reduction targets under the Kyoto Protocol are allocated a number of these units that correspond to the cap on emissions required to meet that target.

Annual Emissions Allocation (AEAs) - A tradable unit corresponding to one tonne of carbon dioxide equivalent of an EU country's cap on non-ETS emissions under the Effort Sharing Decision (ESD).

Bundling - Another possible approach designed to streamline administration efforts and reduce transaction costs. In this approach a number of projects are also grouped together under one umbrella, but new projects cannot be added later. All projects must be included in the project documentation at the time of approval. All projects in a bundle can be described in a single project document and go through validation and registration as if it were one project.

Certified Emissions Reductions (CERs)- A CER is a unit issued under the CDM that is equal to one tonne of carbon dioxide equivalent, calculated using global warming potentials defined by the Kyoto Protocol.

Clean Development Mechanism - The CDM is an arrangement under the Kyoto Protocol that allows industrialised countries with a greenhouse gas reduction commitment (called Annex 1 countries) to invest in projects that reduce emissions in developing countries as an alternative to more expensive emissions reductions in their own countries.

Emissions Reductions Units (ERUs) - This is the basic unit of Joint Implementation (JI) projects. One ERU represents the successful emission-reduction equivalent to one tonne of carbon dioxide equivalent (1t CO_2e).

Emissions Trading Schemes (ETSs) - A flexible mechanism created by the Kyoto accords which is intended to allow the exchange of emission rights between countries or companies to achieve their objectives in reducing emissions of greenhouse gases.

European Allowance (EUAs) - Tradable emission credits from the EU Emissions Trading Scheme (EU ETS). Each allowance carries the right to emit one tonne of carbon dioxide.

Joint Implementation - A programme under the Kyoto Protocol that allows industrialised countries to meet part of their required cuts in greenhouse gas emissions by paying for projects that reduce emissions in other industrialised countries.

Programme of Activities (POA) – An approach developed for use in the CDM and JI mechanisms to streamline bureaucratic requirements and reduce costs. Under POA, many emissions reduction projects owned by many different owners can be grouped together so that rather than monitor and verify emissions reductions from all projects a sampling approach can be taken. Projects can be added to the PoA at a later date, providing greater flexibility than a project-specific approach.

United Nations Framework Convention on Climate Change (UNFCCC) – the UNFCCC is an international treaty signed by 189 countries. The treaty, to which the USA is party, considers what can be done to reduce global warming and to cope with the inevitable increases in temperature.

Verified Emissions Reduction (VER) – A unit generated by a non-compliance emissions reduction standard, such as the Voluntary Carbon Standard, or voluntary Gold Standard.

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ECOFYS Netherlands B.V.

Kanaalweg 15G
3526 KL Utrecht

T: +31 (0) 30 662-3300
F: +31 (0) 30 662-3301

E: info@ecofys.com
I: www.ecofys.com