

AFRY

ÅF PÖYRY



Oil and water? Mixing carbon removals with the EU ETS

17 May 2021

DR MOSTYN BROWN

DRAFT

Disclaimer and Rights

NOTHING IN THIS REPORT IS OR SHALL BE RELIED UPON AS A PROMISE OR REPRESENTATION OF FUTURE EVENTS OR RESULTS. AFRY HAS PREPARED THIS REPORT BASED ON INFORMATION AVAILABLE TO IT AT THE TIME OF ITS PREPARATION AND HAS NO DUTY TO UPDATE THIS REPORT.

AFRY makes no representation or warranty, expressed or implied, as to the accuracy or completeness of the information provided in this report or any other representation or warranty whatsoever concerning this report. This report is partly based on information that is not within AFRY's control. Statements in this report involving estimates are subject to change and actual amounts may differ materially from those described in this report depending on a variety of factors. AFRY hereby expressly disclaims any and all liability based, in whole or in part, on any inaccurate or incomplete information given to AFRY or arising out of the negligence, errors or omissions of AFRY or any of its officers, directors, employees or agents. Recipients' use of this report and any of the estimates contained herein shall be at Recipients' sole risk.

AFRY expressly disclaims any and all liability arising out of or relating to the use of this report except to the extent that a court of competent jurisdiction shall have determined by final judgment (not subject to further appeal) that any such liability is the result of the willful misconduct or gross negligence of AFRY. AFRY also hereby disclaims any and all liability for special, economic, incidental, punitive, indirect, or consequential damages. **Under no circumstances shall AFRY have any liability relating to the use of this report in excess of the fees actually received by AFRY for the preparation of this report.**

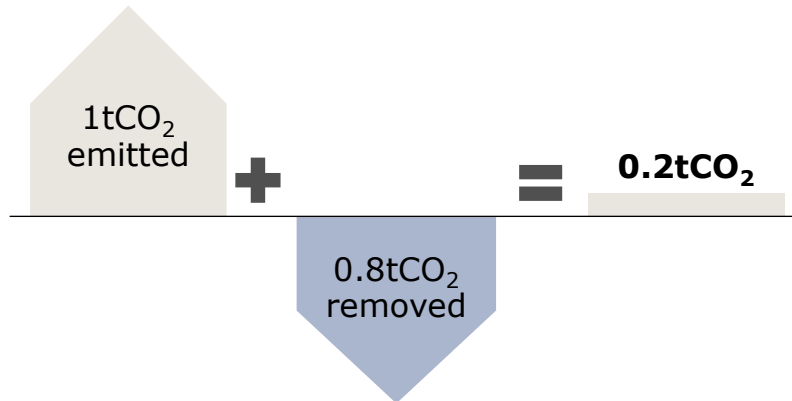
All information contained in this report is confidential and intended for the exclusive use of the Recipient. The Recipient may transmit the information contained in this report to its directors, officers, employees or professional advisors provided that such individuals are informed by the Recipient of the confidential nature of this report. All other use is strictly prohibited.

All rights (including copyrights) are reserved to AFRY. No part of this report may be reproduced in any form or by any means without prior permission in writing from AFRY. Any such permitted use or reproduction is expressly conditioned on the continued applicability of each of the terms and limitations contained in this disclaimer.

Carbon removal: technologies that remove carbon from the atmosphere, store it (indefinitely), and are net-negative

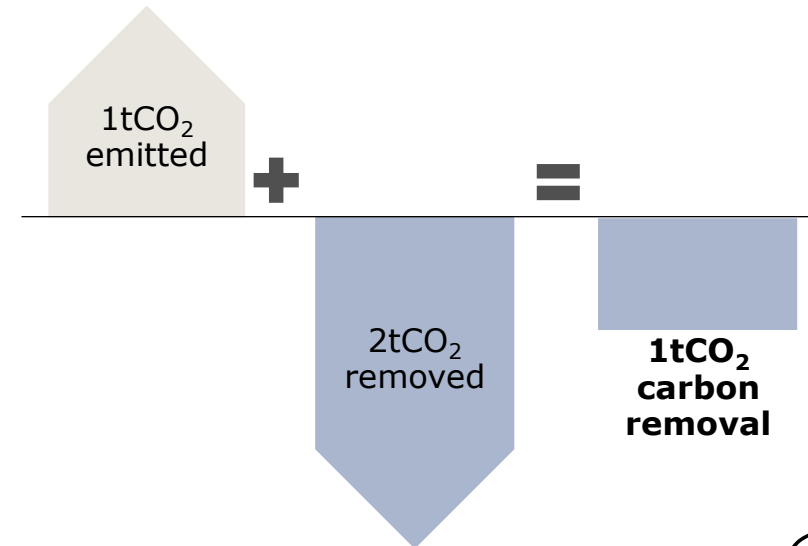
CARBON CAPTURE AND STORAGE (CCS)

- CO₂ captured from fossil fuel combustion
- CO₂ stored
- Emissions reduced, but still net-positive



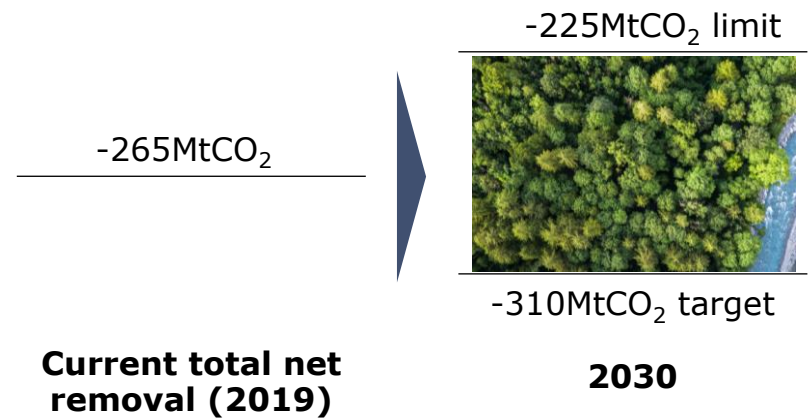
CARBON REMOVAL

- CO₂ captured from **atmosphere**
 - CO₂ stored
 - **Net-negative**
- e.g. reforestation, BECCS, DACCS*

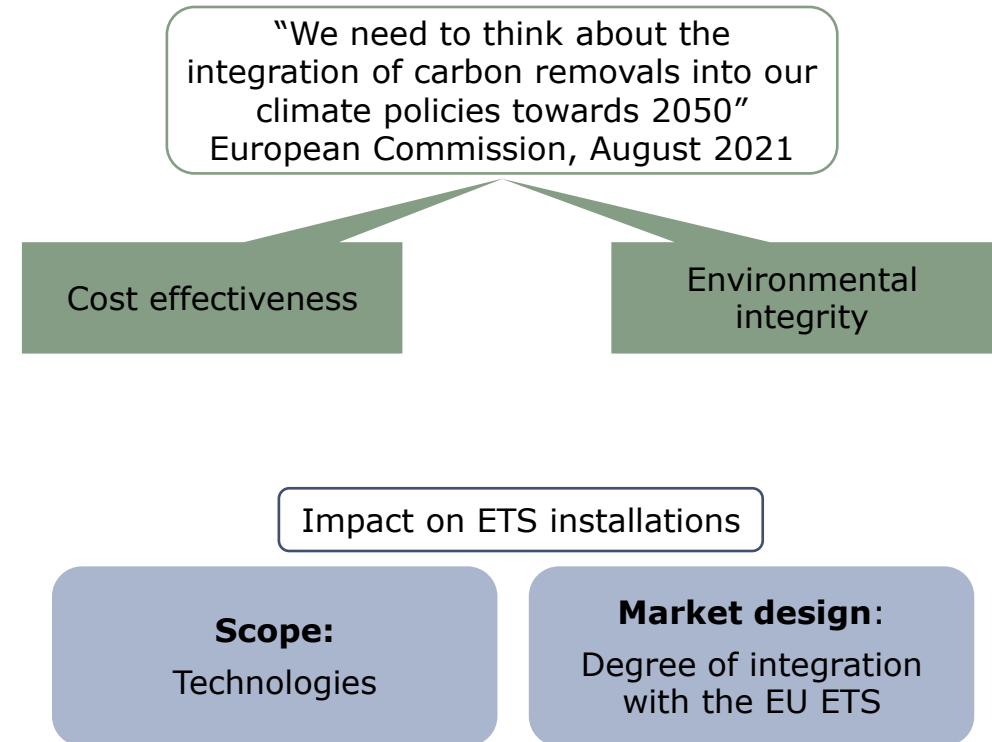


Carbon removal policies are in their infancy

CURRENT FOCUS IS ON THE LULUCF¹ SECTOR



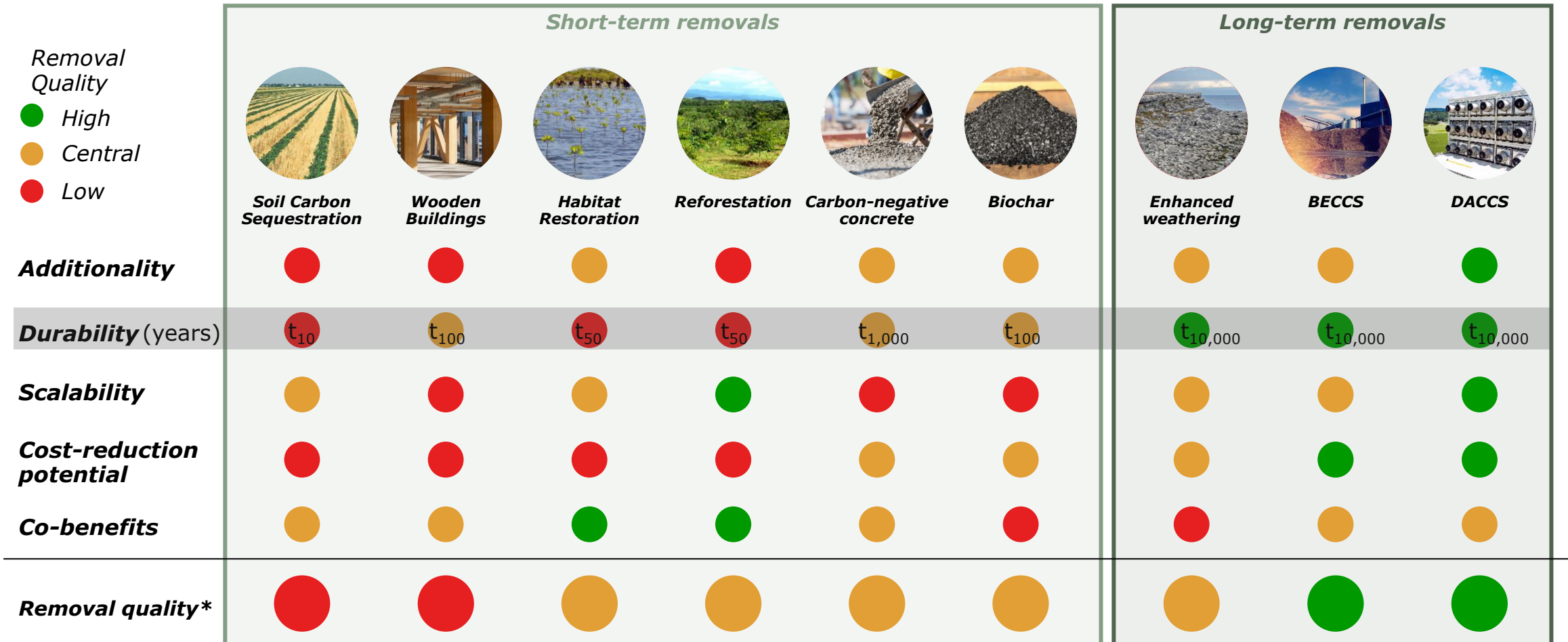
HOW WILL THE ETS SECTOR GET TO NET ZERO?



¹ Human activities impact terrestrial sinks, through **land use, land-use change and forestry (LULUCF)** activities.

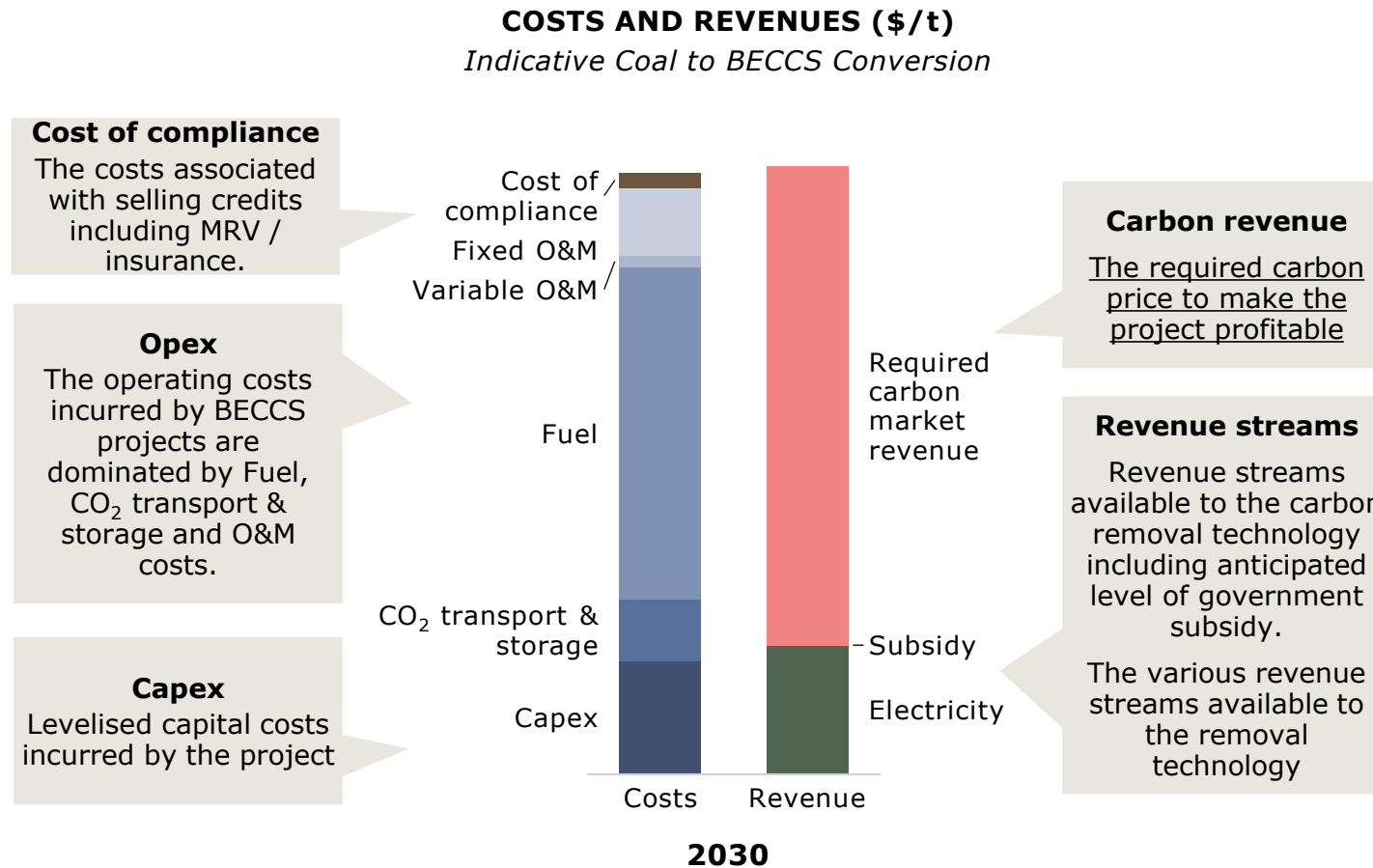
SCOPE

Durability of storage is a key issue for some technologies – perhaps only BECCS/DACCS will be allowed to participate in EU ETS



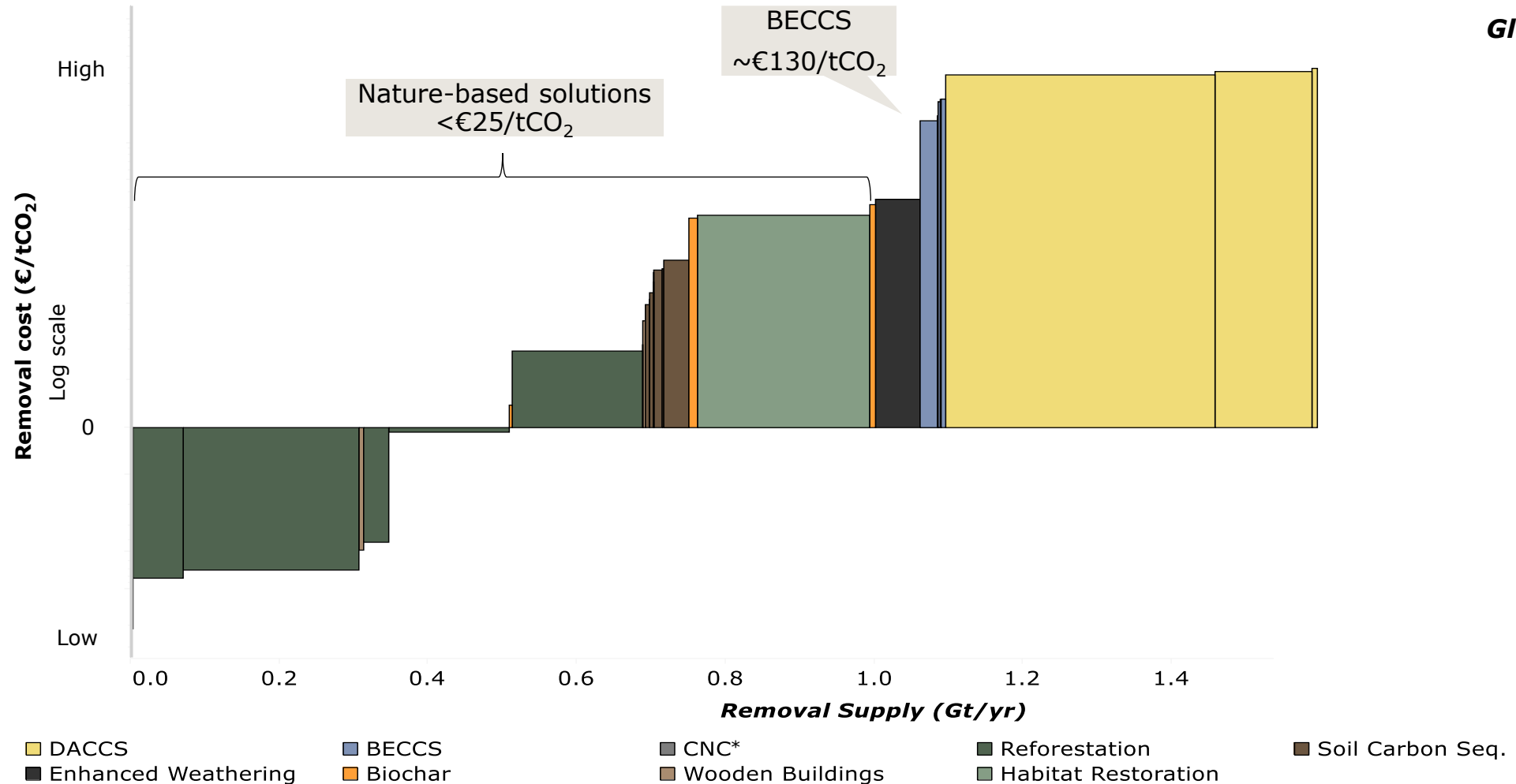
*Average ranking of additionality, durability, scalability, cost reduction potential, and co-benefits scores

How much do removals cost? And how much potential supply is available?



Nature-based solutions could swamp the EU ETS with cheap removals

**2030
Global supply**



* Carbon negative concrete

Three high-level market design options

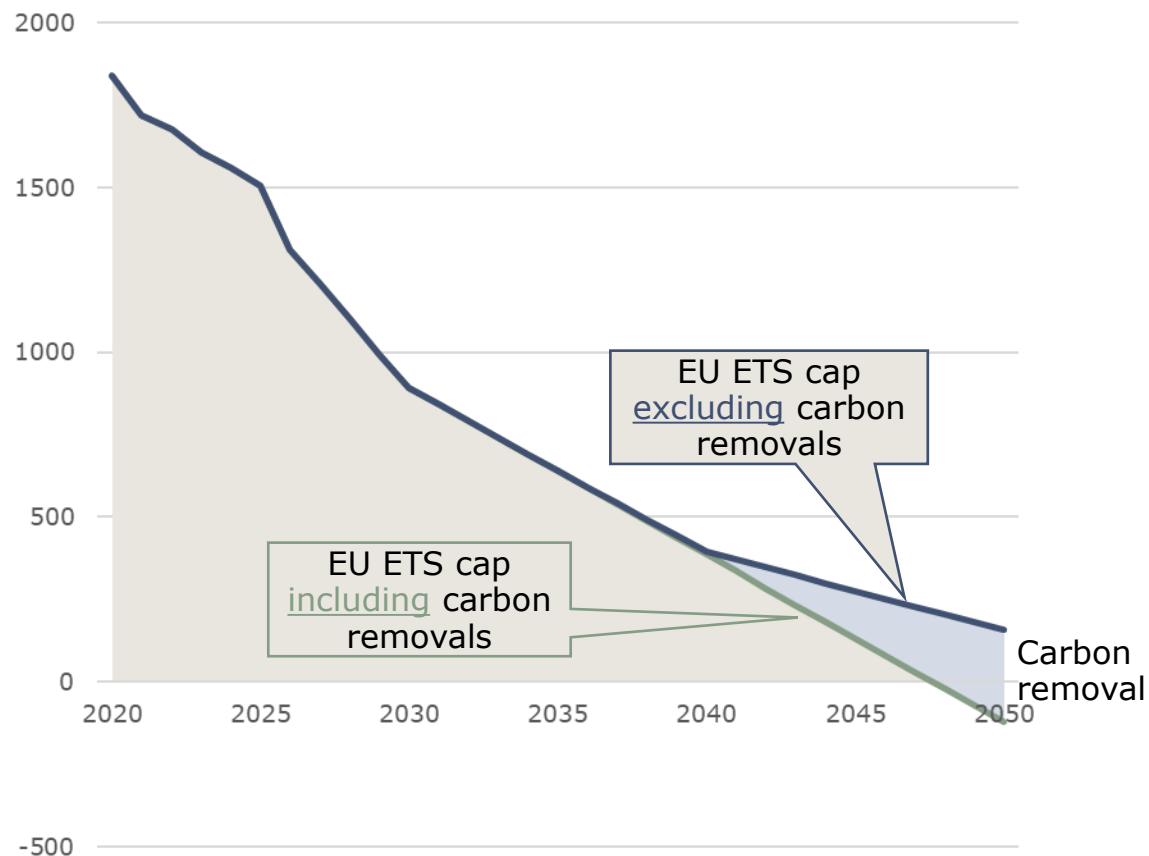
Degree of integration		Pros	Cons
Separate schemes	<ul style="list-style-type: none"> - Commission agrees to buy set volume of removals 	<ul style="list-style-type: none"> - Maintains 'reduction then removal' hierarchy 	<ul style="list-style-type: none"> - EUA participants face high price risk
Hybrid	<ul style="list-style-type: none"> - Carbon removal operators awarded removal certificates - Eligible for submission within EU ETS, within floor/ceilings 	<ul style="list-style-type: none"> - Commission able to regulate/adapt, whilst also enabling price discovery for removals 	<ul style="list-style-type: none"> - Complexity - Economic efficiency depends on floor/ceiling levels
Fully integrated	<ul style="list-style-type: none"> - Carbon removal operators awarded removal certificates - Eligible for submission within EU ETS 	<ul style="list-style-type: none"> - Optimal economic outcome (if removal really is as robust as reduction) - Alleviates risk of very high EUA prices 	<ul style="list-style-type: none"> - Commission have limited ability to control - Potential for removal to de-value reduction efforts



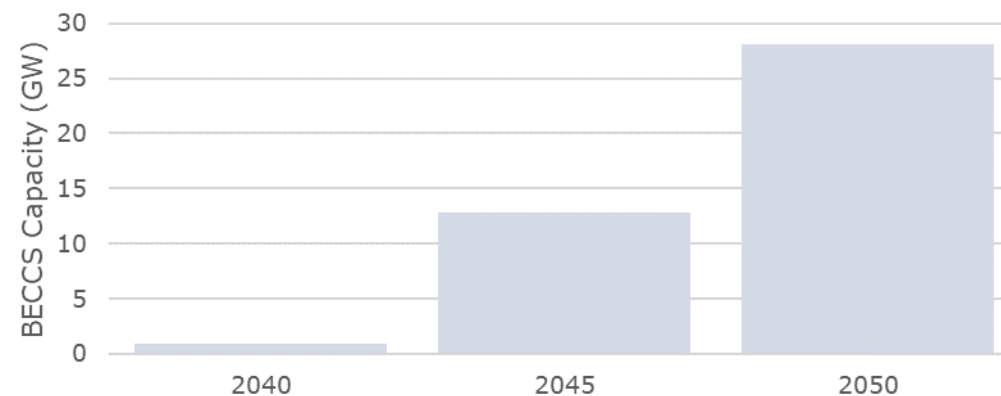
SUMMARY

Removals are essential to get the EU ETS to net-zero (and beyond) at least-cost – without removals participants could face extreme carbon prices

EMISSIONS CAP UNDER THE EU ETS (MT CO₂)



BECCS CAPACITY REQUIRED TO ACHIEVE A NET-NEGATIVE ETS



CARBON REMOVAL ACTS AS A LONG-TERM PRICE CEILING



Indicative 2050 values, real 2020 money

CONTACT INFORMATION

AFRY Management Consulting

DR MOSTYN BROWN
SENIOR CONSULTANT
CARBON PRICING AND REMOVALS

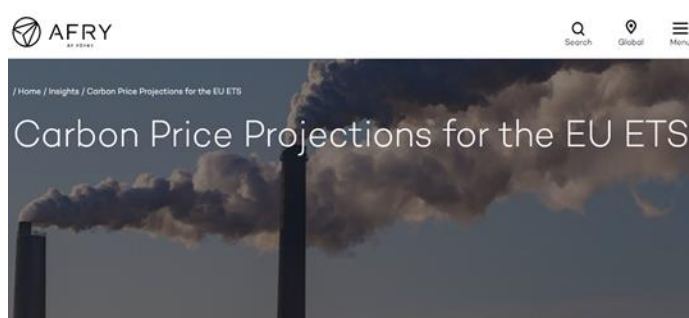
King Charles House, Oxford, OX1 1JD | UK

mostyn.brown@afry.com
+44 7854 518 785

All rights reserved. No part of this document may be reproduced in any form or by any means without permission in writing from AFRY.

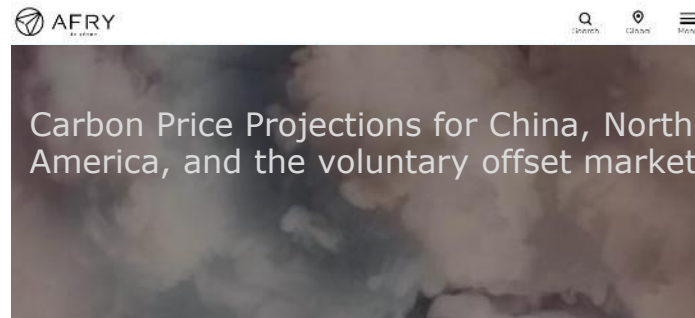
AFRY provide off-the-shelf carbon market reports and bespoke services

EU ETS CARBON MARKET REPORT



- AFRY's **EU ETS carbon market report** covers:
 - Market background
 - Key price risks
 - Drivers of EU ETS carbon prices
 - Carbon price projections
- This report can be delivered on its own or combined with our insights from our power market modelling:
<https://afry.com/en/insight/carbon-price-projections-eu-ets>

OTHER CARBON MARKET REPORTS



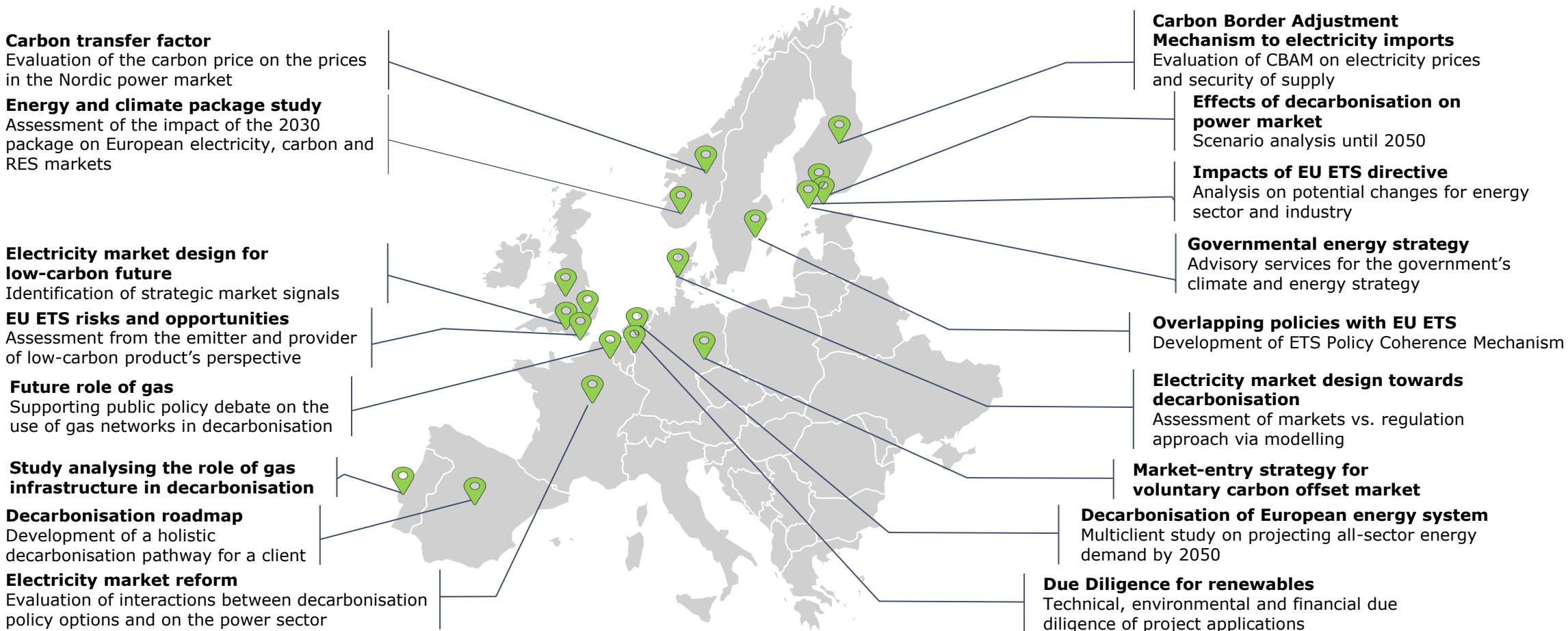
- AFRY covers the evolution of several **mature and emerging compliance markets** around the world, providing insights and price projections for:
 - China
 - North America (WCI, RGGI)
 - the outlook for emerging markets such as Australia; and
 - The voluntary offset market:
<https://afry.com/en/competence/carbon-markets>

BESPOKE WORKSHOPS & WEBINARS

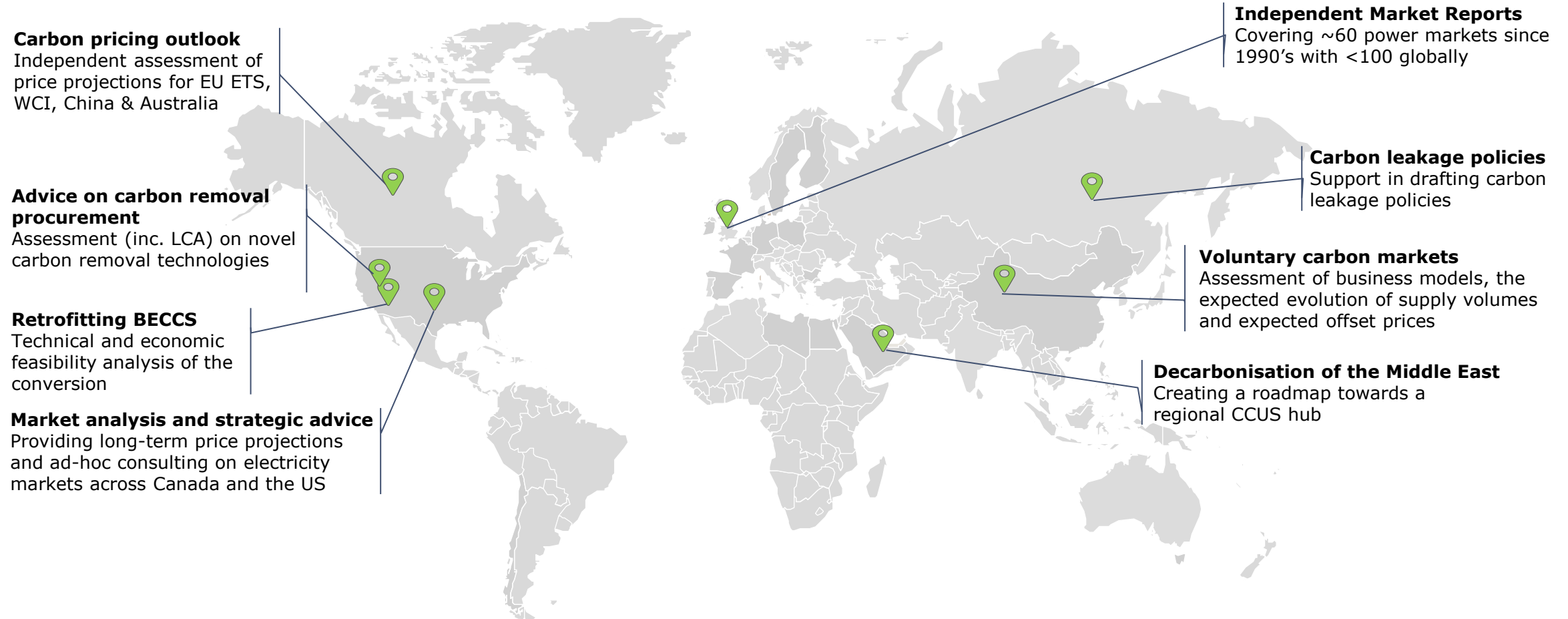


- We provide **bespoke carbon workshops** covering questions you need answers to
- AFRY also organise **client-exclusive Pan-European Price Projections webinars** covering the main carbon changes and other developments:
<https://afry.com/en/webinars/carbon-prices>
<https://afry.com/en/webinars/carbon-offsets-net-zero>

Over 20 carbon pricing projects delivered in Europe over the last five years



AFRY is also delivering carbon pricing projects globally



Project delivery has involved multiple offices and also collaboration with other Divisions.