

CALIFORNIA'S LCFS AND CCS PROTOCOL

A summary for policymakers and project developers, and comparison to other regulations in the US

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OVERVIEW

- An introduction to the LCFS
- The types of CCS projects that qualify for the LCFS
- The requirements of the CCS Protocol of the LCFS
- A comparison of the CCS Protocol and UIC Program in the US
- The opportunity from combining LCFS credits and 45Q tax credits



AN INTRODUCTION TO THE LCFS



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AN INTRODUCTION TO THE LCFS

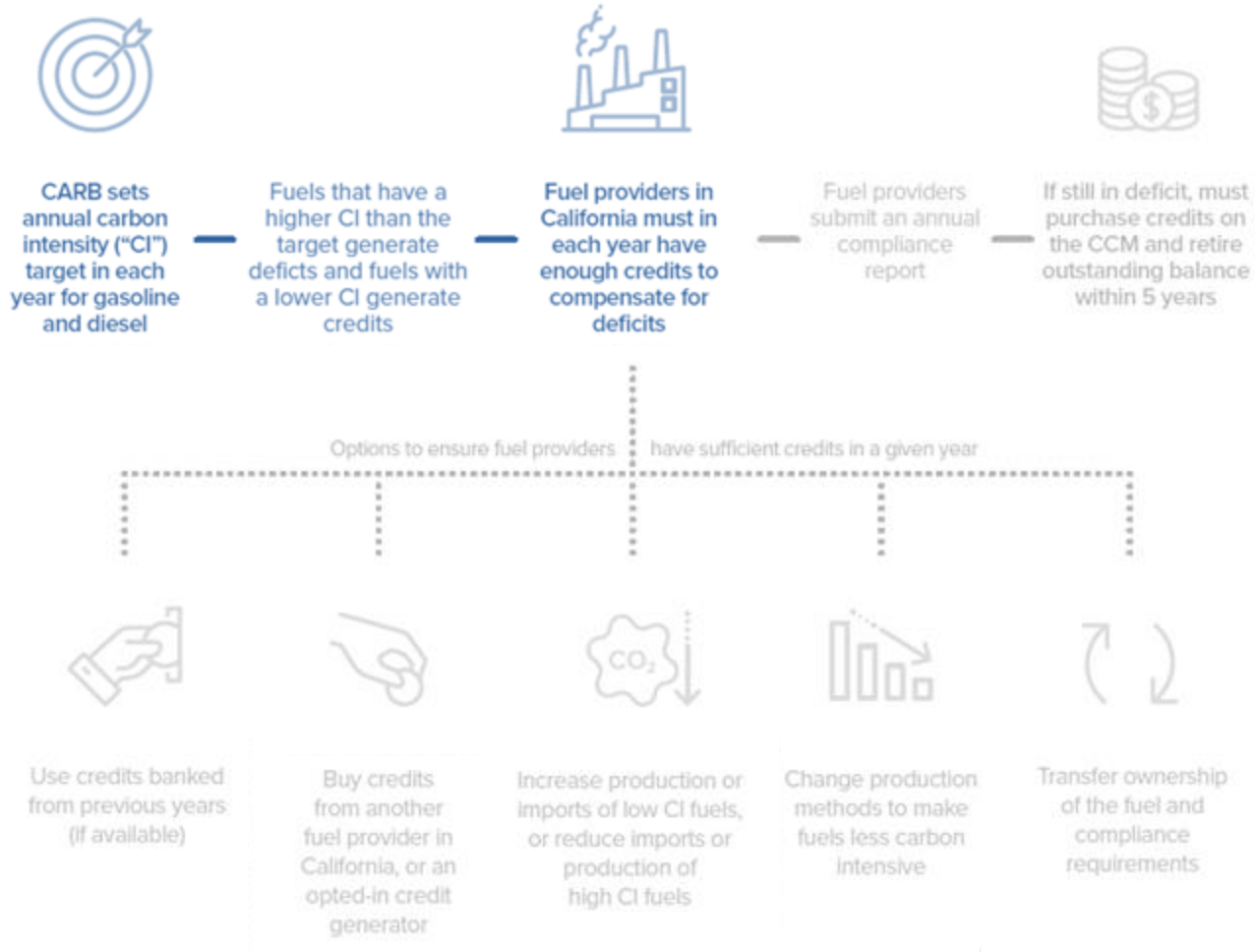
- Introduced by Executive Order in 2007
- Administered by CARB, which has primacy to regulate GHG emissions in California
- A market-based policy, that places lifecycle carbon intensity targets on all transportation fuels sold in California
- Aims to reduce the lifecycle emissions of transport fuels sold in California
 - Diversifying fuel mix
 - Reducing petroleum dependency
 - Reducing GHG emissions and other air pollutants
- Carbon intensity benchmarks fall over time, with a 20% reduction by 2030 relative to 2010 levels



AN INTRODUCTION TO THE LCFS



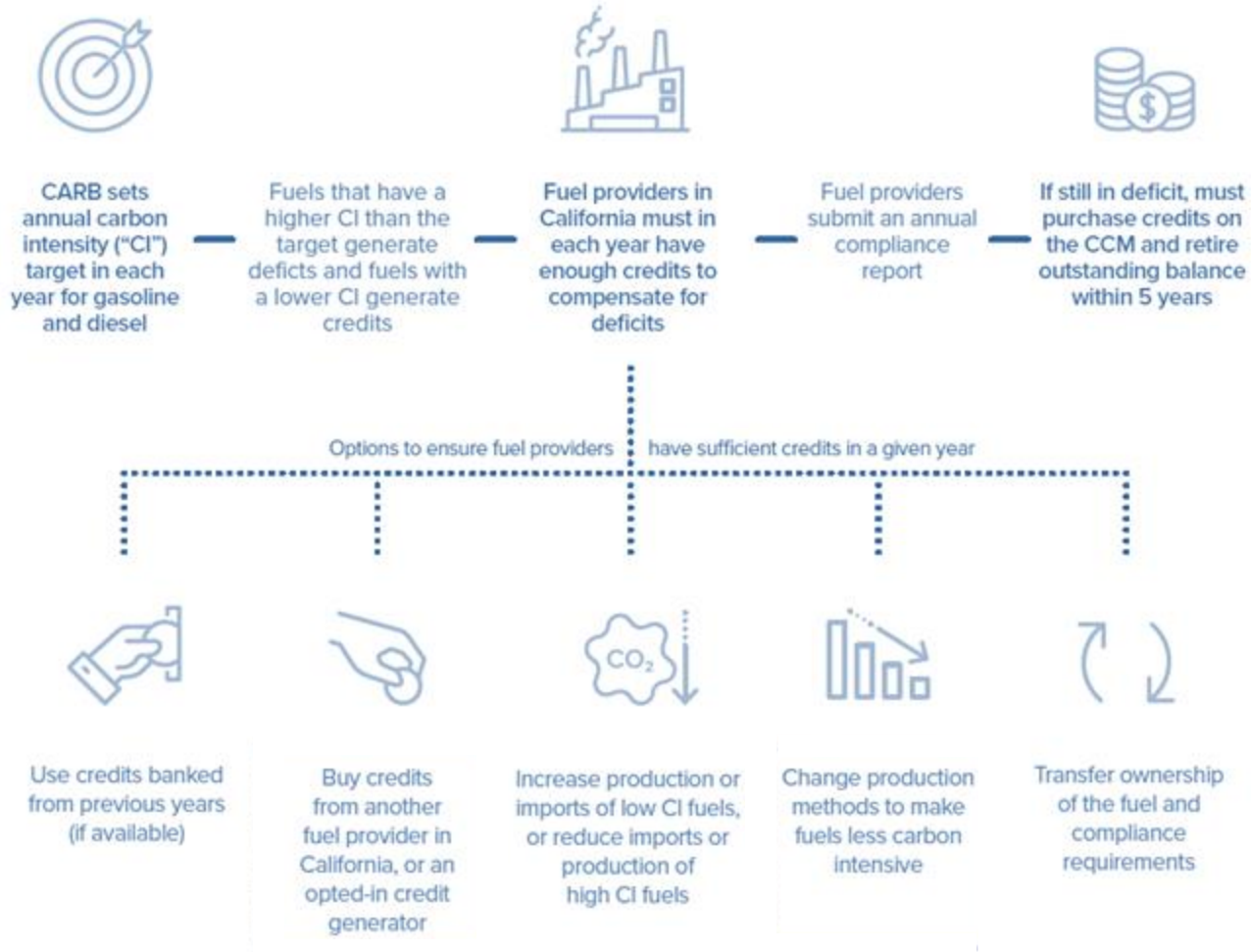
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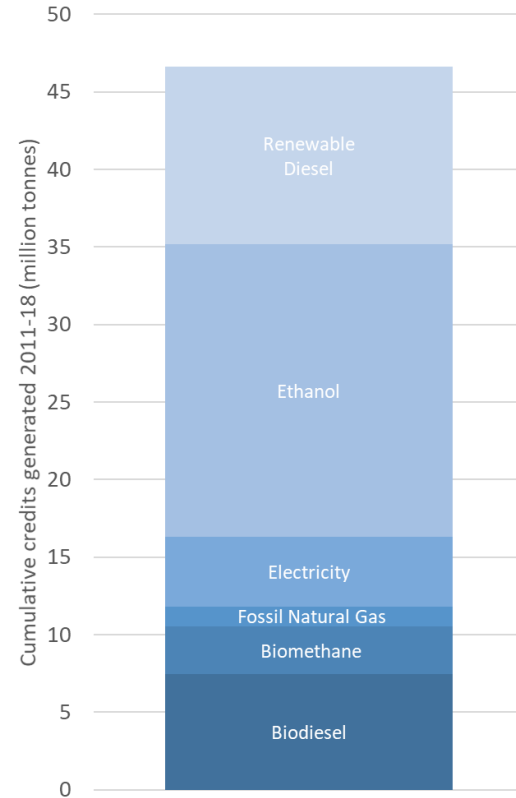
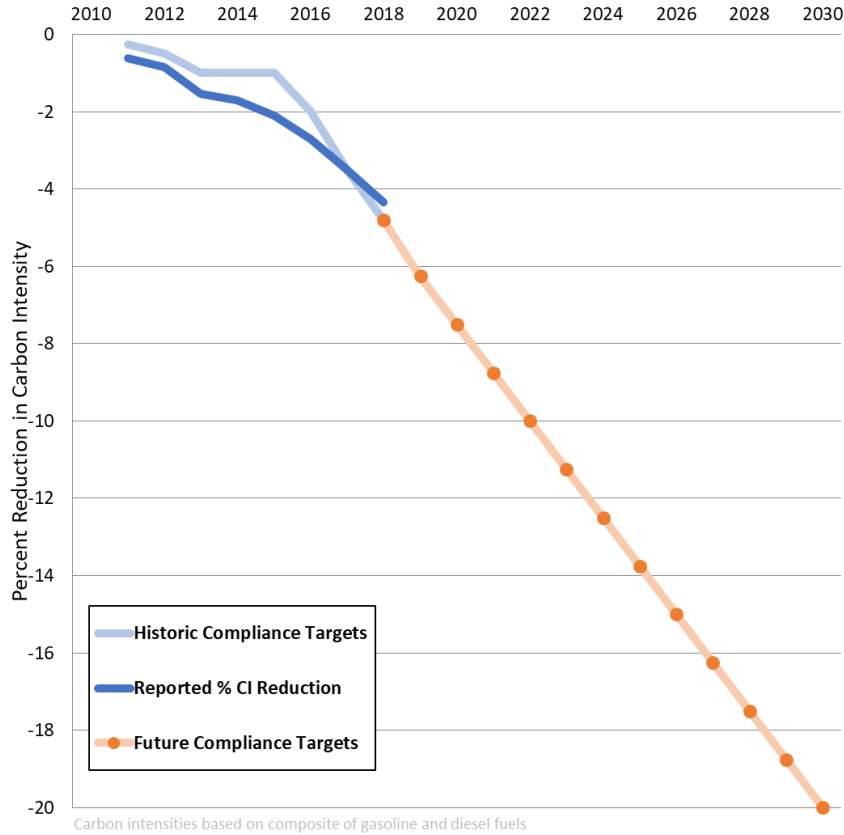
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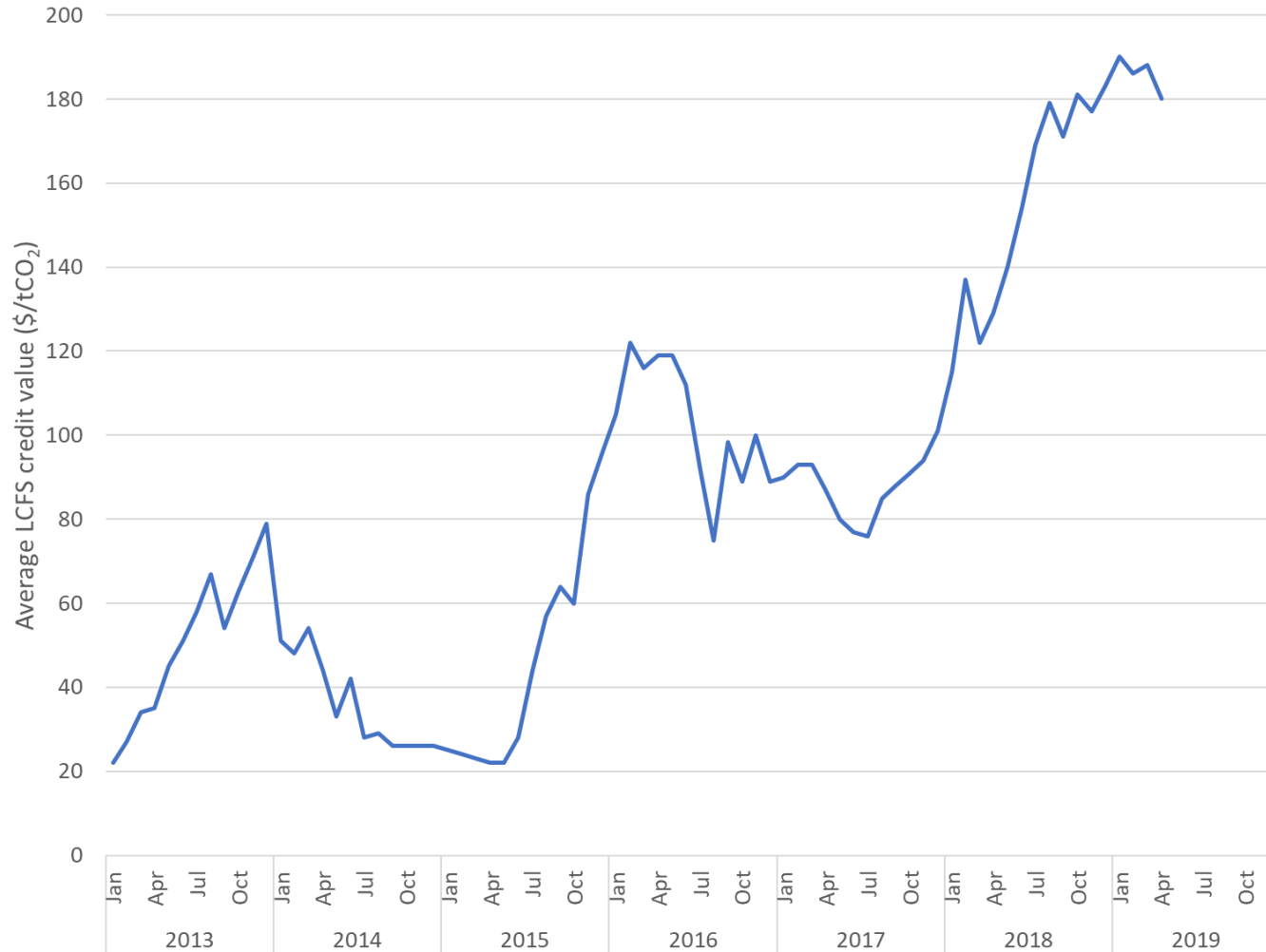
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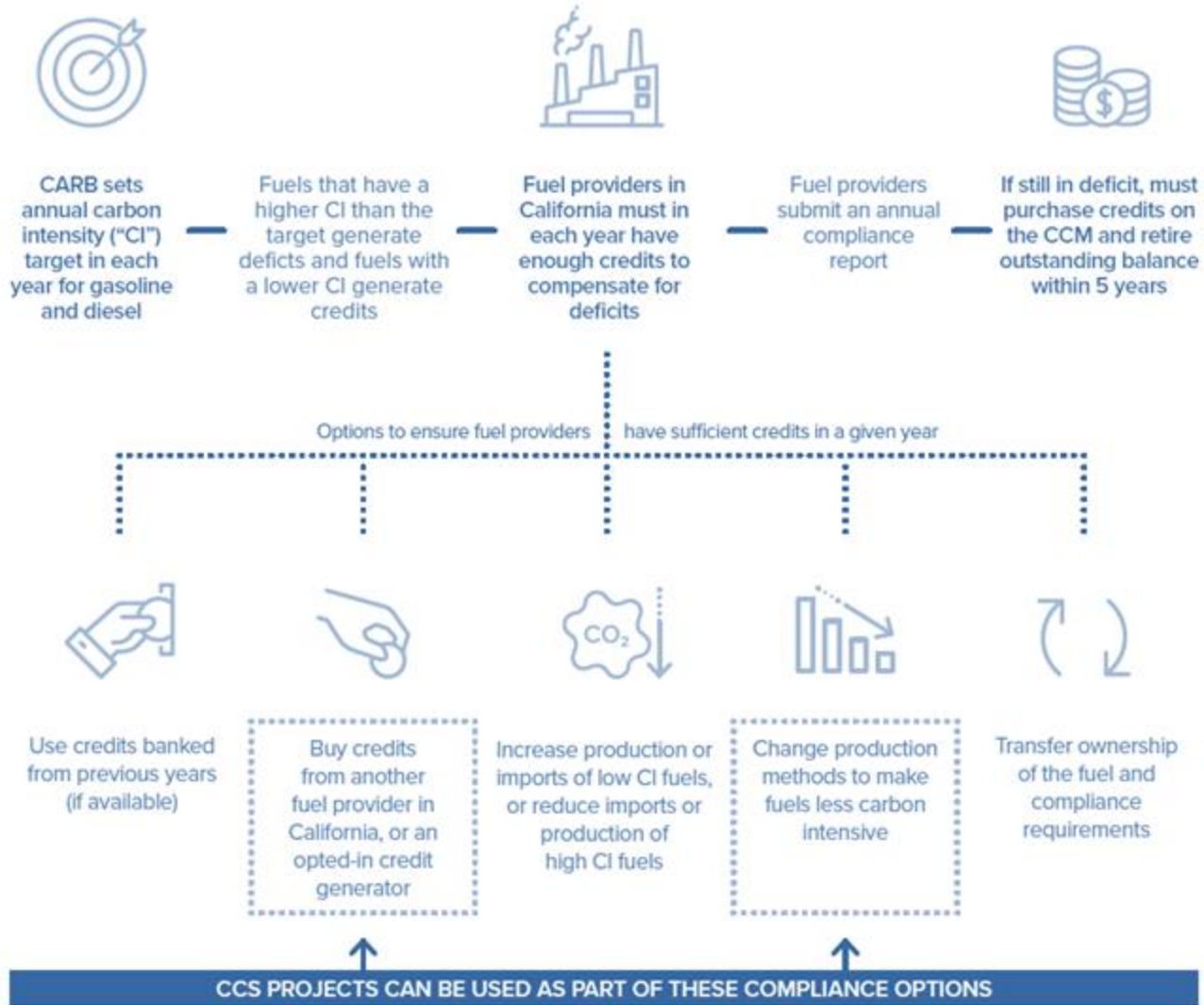


CCS PROJECTS THAT QUALIFY FOR THE LCFS



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AN INTRODUCTION TO THE LCFS



CCS PROJECTS THAT QUALIFY FOR THE LCFS



DIRECT AIR CAPTURE PROJECTS



CCS AT OIL & GAS PRODUCTION FACILITIES



CCS AT REFINERIES PROJECTS



ALL OTHER CCS PROJECTS (E.G. CCS WITH ETHANOL)

Location of CCS project	Anywhere in the world	Anywhere, provided they sell the transportation fuel in California	Anywhere, provided they sell the transportation fuel in California	Anywhere, provided they sell the transportation fuel in California
Storage site	Onshore saline or depleted oil and gas reservoirs, or oil and gas reservoirs used for CO ₂ -EOR			
Credit method	Project-based	Project-based, under the Innovative Crude Provision	Project-based, under the Refinery Investment Credit Program	Project-based or fuel pathway
Earliest date which existing projects eligible	Any	2010	2016	Any
Requirements	Project must meet requirements specified in the CCS Protocol			
Additional restrictions	None	Must achieve minimum CI or emission reduction	None	None



THE CCS PROTOCOL OF THE LCFS



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PERMANENCE REQUIREMENTS

Site characterisation and risk assessment

- Site must meet minimum selection criteria
- Provide detailed information on the geological and hydrological characteristics of the storage site
- Complete a risk assessment and risk management plan that quantifies the risk of CO₂ leakage for up to 100 years post injection
 - A project cannot qualify for the LCFS if the risk assessment includes a “High” risk
- Provide computational modelling of the CO₂ plume



PERMANENCE REQUIREMENTS

Well construction and corrective action

- Wells must be constructed in a way that prevents the movement of fluids into unauthorised zones, allows appropriate testing and permits continuous monitoring of pressure
- Deviations in Well Construction Plan must be approved
- All materials used must meet or exceed international standards
- A program of testing is required to confirm the site's integrity
- Operators must demonstrate how corrective action has remediated any wells requiring it



PERMANENCE REQUIREMENTS

Operation

- Specific injection pressures are specified by the Protocol
- Operational requirements concerning injection practices and well maintenance apply
- Threats to the mechanical integrity of a well are to be treated in accordance with the Protocol



PERMANENCE REQUIREMENTS

Testing and monitoring

- A testing and monitoring plan must be prepared by an operator
- An operator must maintain and comply with the plan, to ensure that the CCS project is operating as certified and that the CO₂ injected is permanently sequestered
- Monitoring must continue for at least 100 years post-injection
- Requirements for injection rate and volume, and wellhead and downhole pressure monitoring, CO₂ plume evaluation, demonstration of mechanical integrity and inspections are introduced.



PERMANENCE REQUIREMENTS

Well plugging and abandonment

- Wells must be treated in accordance with an operator's plan
- The Executive Officer is to be informed prior to plugging, converting or abandoning a well
- Written approval must be received before plugging can be completed
- Following the plugging of a well, a report is to be submitted setting out the method used and confirming that no leaks have been found.



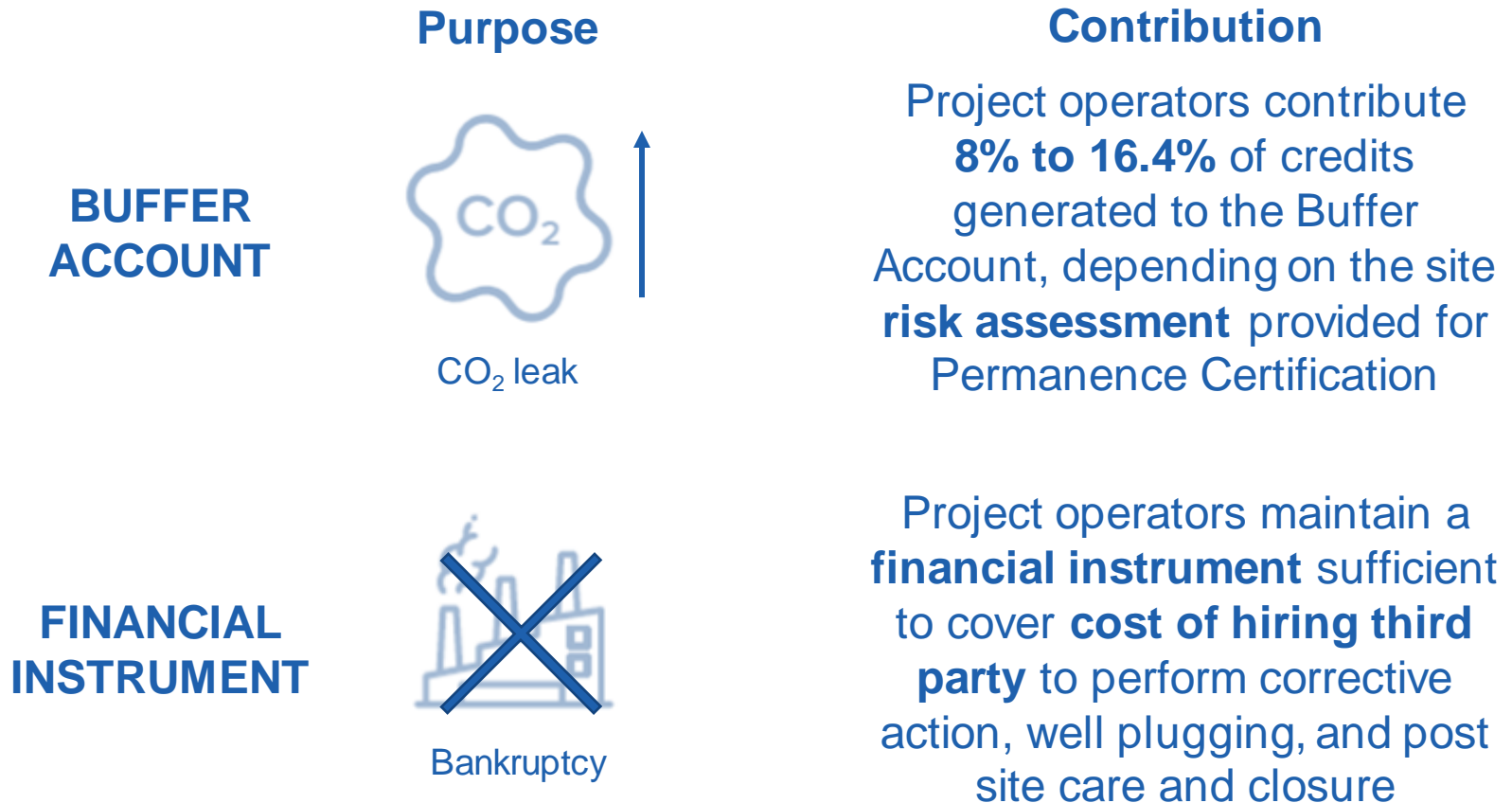
PERMANENCE REQUIREMENTS

Post-injection site care and site closure

- An operator is required to comply with their post-injection site care and site closure plan, following the completion of injection.
- Injection wells are to be plugged within 24 months of injection being completed
- 15 years post-injection, the operator may submit evidence to CARB to demonstrate stabilization of the CO₂ plume. If approved, all remaining open wells may be plugged and abandoned.
- Site closure may only occur at least 100 years after injection has been completed



INSURANCE AND FINANCIAL MECHANISMS



CREDITING (ACCOUNTING REQUIREMENTS)

	PROJECT BASED CREDITING	FUEL PATHWAY CREDITING
Example projects	DAC projects, CCS at refineries	Ethanol
Estimate of no. credits	CO ₂ injected – GHG emissions of CCS project	(CI benchmark – CI fuel) * Energy economy ratio * conversion factor
Verification	Quarterly or annually	
Entity that receives credits	Capture operator	

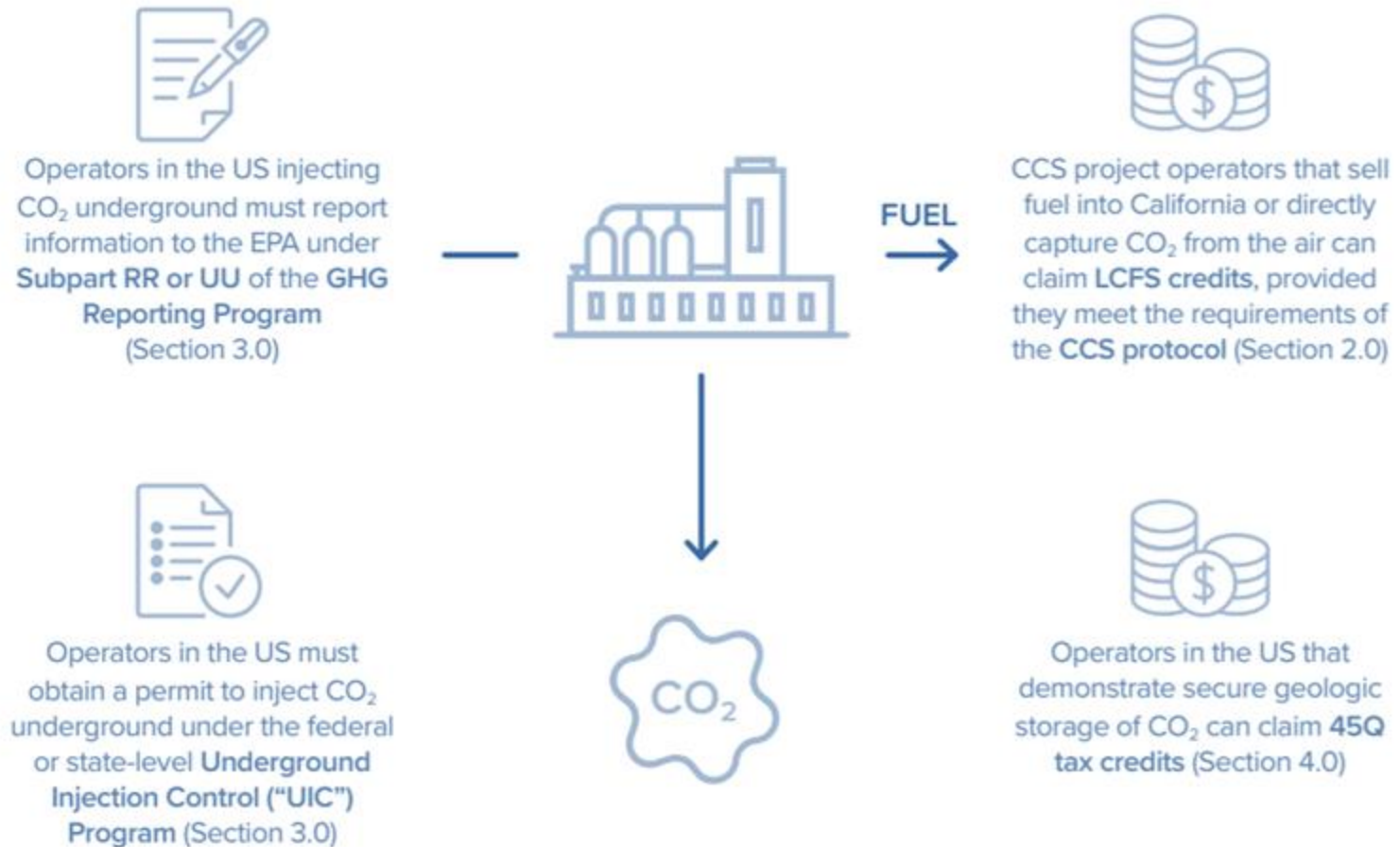


A COMPARISON OF THE CCS PROTOCOL TO THE UIC AND GHGR PROGRAMS



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THE UIC AND GHG REPORTING PROGRAMS



COMPARISON TO THE CCS PROTOCOL

PHASE OF PROJECT	CLASS II WELLS CO2 INJECTED FOR EOR*	CLASS VI WELLS DEDICATED GEOLOGICAL STORAGE
Permitting	Yellow	Green
Well construction and corrective action	Green	Green
Operation	Red	Yellow
Testing and monitoring	Yellow	Green
Plugging and abandonment	Yellow	Green
Post-injection site care and closure	Red	Yellow
Insurance and financial mechanisms	Yellow	Yellow
Reporting	Green	Green

* Class II permit holders assumed to report under Subpart RR. Based on federal requirements of the UIC Program.



THE OPPORTUNITY FROM COMBINING LCFS CREDITS AND 45Q TAX CREDITS



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45Q TAX CREDITS

- Introduced in 2008 under the Energy Improvement and Extension Act in the US
- Provides capture operators with credits for each tonne of CO₂ stored or utilised that can be used to reduce their tax liability
- Recently amended under the Bipartisan Budget Act in 2018, which included an increase to the tax credit value
- IRS are currently consulting on issues arising from the amendments

Tax credit value (\$/tCO ₂)	2019	...	2026	2026 onwards
Dedicated geological storage	31	...	50	Indexed to inflation
CO ₂ -EOR	19	...	35	
Other CO ₂ utilisation	19	...	35	



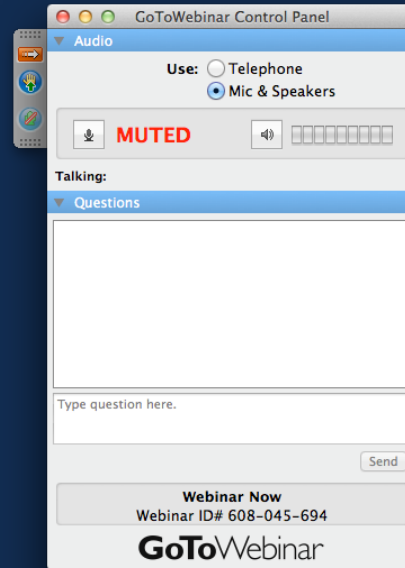
A COMPARISON OF THE LCFS AND 45Q ELIGIBILITY REQUIREMENTS

	LCFS	45Q
GEOGRAPHIC SCOPE	Anywhere provided they sell fuel into California (with exception for DAC projects)	Anywhere in the US
TYPES OF CCS PROJECT	Any fuel production facility or DAC facility that captures and either stores CO ₂ or injects for CO ₂ -EOR onshore	Any industrial or DAC facility that stores CO ₂ or uses it for EOR or other utilisation purposes
MINIMUM PROJECT SIZE	None	Minimum thresholds for all projects exist
EMISSIONS COVERED	CO ₂ , CH ₄ , N ₂ O, VOCs and CO	Carbon oxide
QUALIFICATION PERIOD RESTRICTIONS	None	Construction must begin by 1 Jan 2024
CREDIT GENERATION DURATION	Duration of injection	12 years
CREDIT BUFFER & INVALIDATION	CCS projects must contribute to the Buffer Account	IRS is currently consulting on the approach to the recapture of tax credits in the event of leakage
PERMANENCE REQUIREMENTS	Demonstrated through receiving and maintaining Permanence Certification under the LCFS	IRS is currently consulting on the permanence requirements



QUESTIONS

Please submit your questions in English directly into the GoToWebinar control panel.



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Please submit any feedback to: webinar@globalccsinstitute.com

You can contact us directly at:

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