



New Pathways for Carbon Offsets

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LMOP Special Session
Reno, Nevada

March 29, 2017



Photo credit: Sage Metering



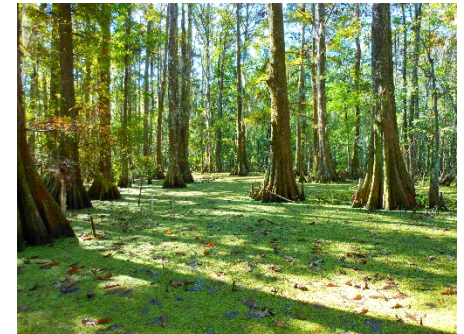
American Carbon Registry (ACR)

- Founded in 1996 as the first private voluntary GHG registry & joined Winrock in 2007 to
 - Develop and approve carbon offset accounting standards & methodologies / protocols
 - Oversee independent verification by accredited entities
 - Review GHG emissions reduction projects and issue serialized offsets on a transparent registry platform
- Approved in December 2012 as California Offset Project Registry
 - Have supported ARB's implementation of the Cap-and-Trade Offset Program for four years
- ACR offset credits for nine project types eligible for compliance with Washington Clean Air Rule starting in 2017



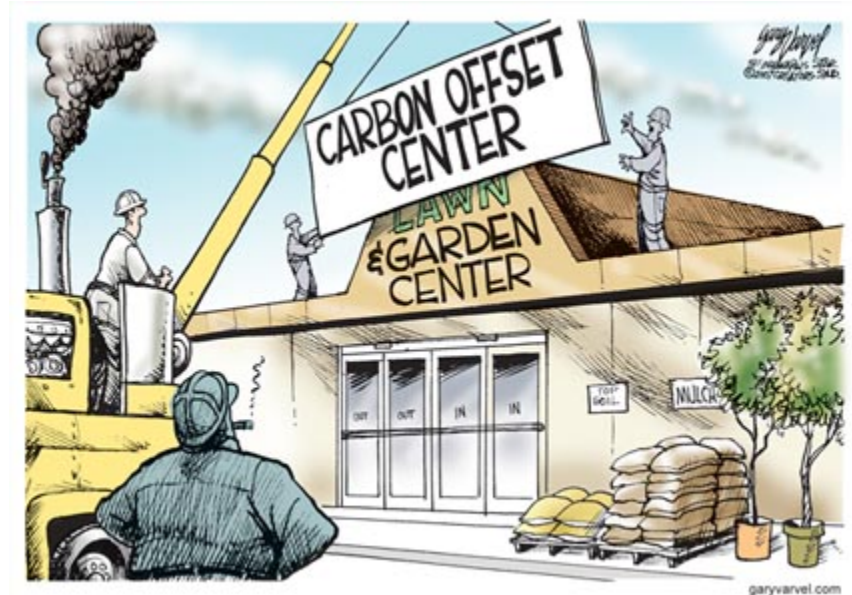
80+ million serialized offsets issued from over 200 projects:

- Forestry
- Land Use & Agriculture
- Industrial Processes
- Transportation Efficiency
- Energy



What is a Carbon Offset?

- A carbon offset (AKA a carbon credit) is equal to 1 metric ton of CO₂e emission reductions from an unregulated source
- Additional, conservative, consistent, transparent, and verifiable
- Carbon offsets cannot be required by law
- Purchased by entities or people to mitigate their carbon footprints
- Transacted in the carbon market using serial numbers to avoid double counting



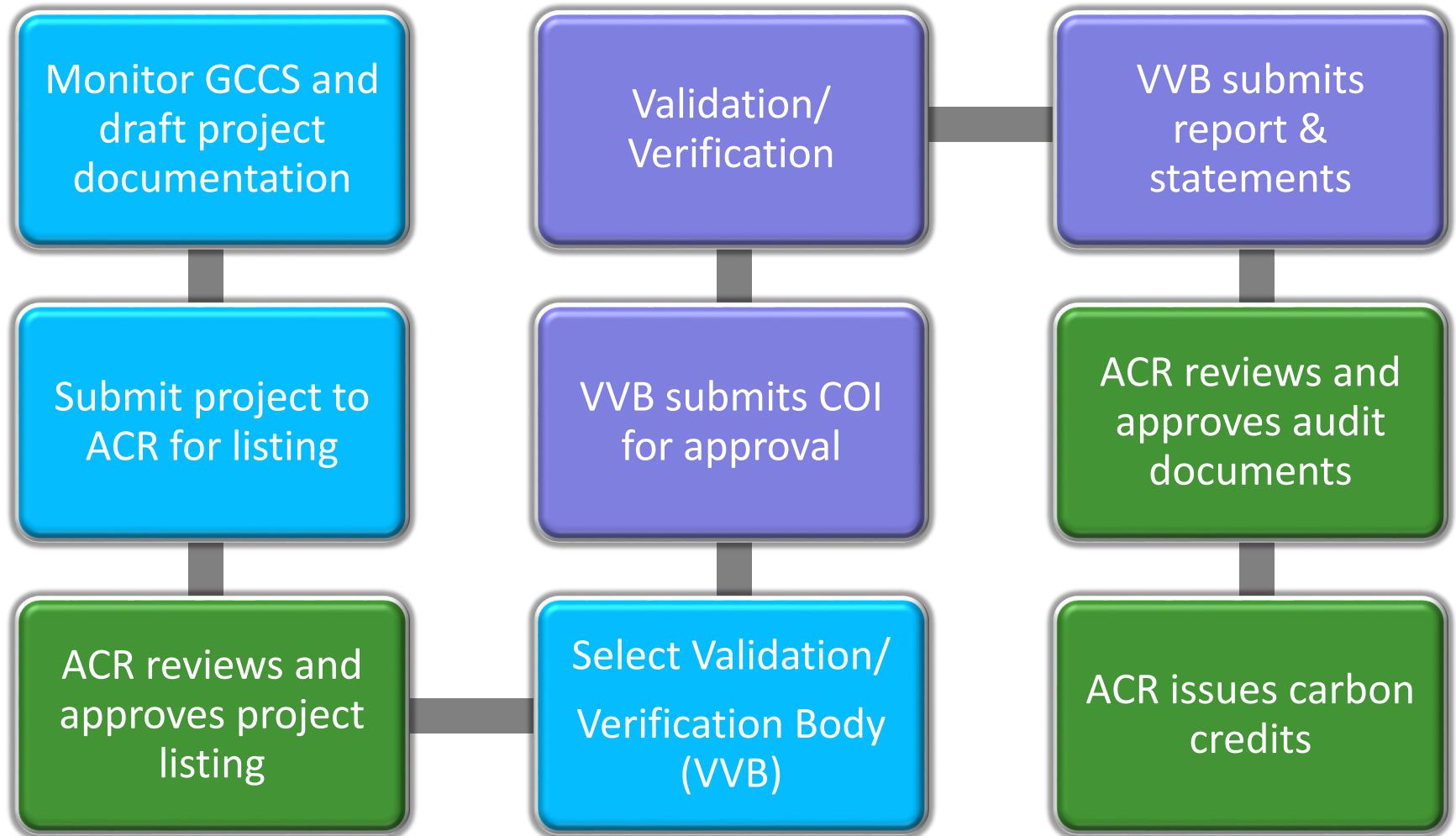
Landfill Gas & Beneficial Use Projects

- ACR methodology for projects eligible in the U.S.
- Project activities may include LFG destruction in a flare, LFGTE, pipeline injection and/or conversion to CNG/LNG for vehicles
- Allows for new or existing projects that meet the ACR performance standard or three-prong additionality test
- Flexible reporting periods – annual verifications not required

Methodology Requirements

- Continuous monitoring of flow + methane content at the destruction device
- Annual field checks of monitoring equipment
- Record keeping of other required parameters
- Prepare a GHG Project Plan and maintain a monitoring report throughout the project's duration
- Validation (once) and independent, third-party verification of the project

Carbon Offset Development Cycle



Landfill Gas Voluntary Carbon Offsets

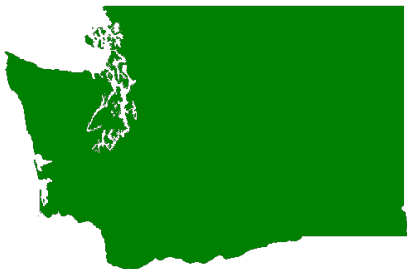
- Over 30 million LFG offsets issued to 125+ U.S. projects in 36 states over the past decade
- LFG offsets very popular with U.S. corporate voluntary buyers: strong local benefits at a good price
- Over 7 million tonnes purchased by U.S. voluntary buyers in 2015 at an average \$2/tonne (Ecosystem Marketplace)

Sources of compliance demand for LFG offsets include:

- Washington (under Clean Air Rule)
- Regional Greenhouse Gas Initiative (RGGI)

Emerging compliance markets for LFG offsets include:

- Oregon – planning to link with California
- International Civil Aviation Organization (ICAO)



LFG Offset Project Nuts & Bolts

Example budget for a 600 scfm flare-only project

Task	Cost
Implementation	\$1,000,000
Annual financing cost	\$129,500
Annual monitoring + operation	\$45,000
Technical consultant (if applicable)	\$25,000
Carbon project documentation	\$10,000
Carbon validation/verification	\$10,000
Carbon project registration	\$2,500

Potential return on investment

Total annual offsets generated	60,000
Price per ton (voluntary)	\$2 - \$4
Price per ton (compliance)	\$3 - \$7
Annual gross revenue	\$180,000 - \$300,000

The Nuts & Bolts

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Potential return on investment

Total annual offsets generated	60,000
Price per ton (voluntary)	\$2 - \$4
Price per ton (compliance)	\$4 - \$12
Annual gross revenue	\$180,000 - \$300,000

Why Generate Carbon Credits?

Reasons to get involved in a carbon project may vary, but keep in mind that:

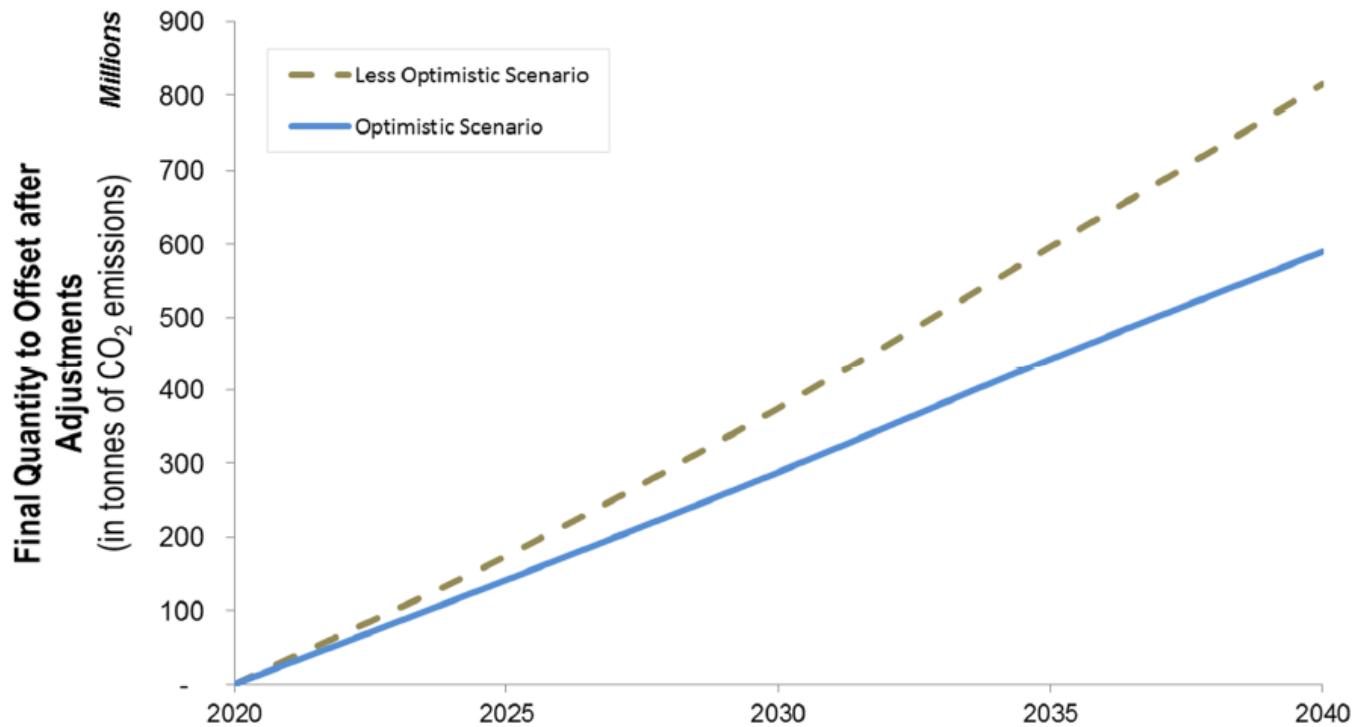
- Credits can create a revenue stream ahead of regulation
- Carbon prices will rise as demand continues to come online
- Carbon projects often result in safer work environments that benefit the community and local economy

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Potential Offsetting Requirements

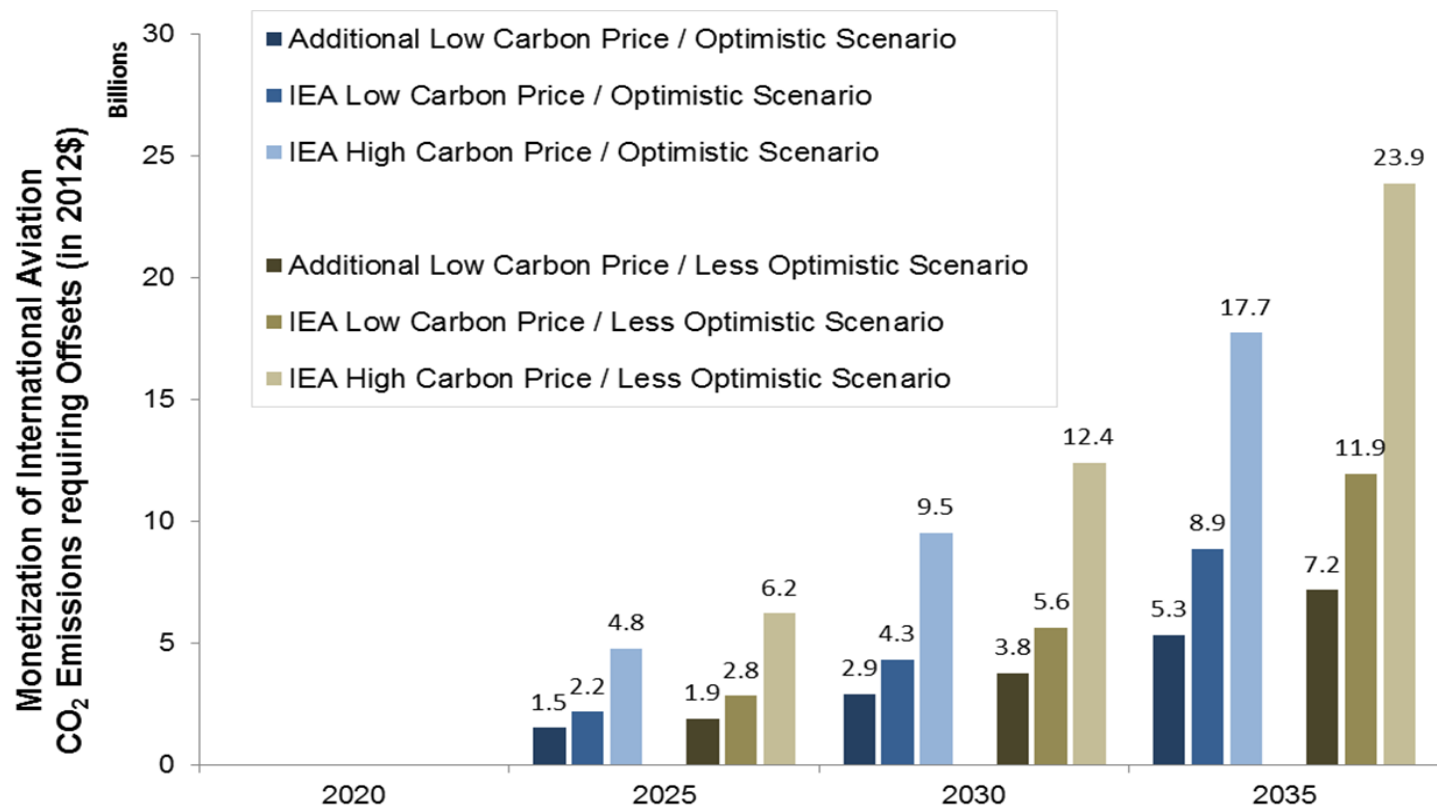


Final Quantity to Offset after adjustments (in Million tonnes of CO ₂ emissions)	2020	2025	2030	2035	2040
Less Optimistic Scenario	-	174	376	596	816
Optimistic Scenario	-	142	288	443	590

Source: CAEP analysis presented at EAG/15

Source: ICAO

Potential Offsetting Costs



Carbon Price Assumptions:

IEA High	20 \$/ton	33 \$/ton	40 \$/ton
IEA Low	8 \$/ton	15 \$/ton	20 \$/ton
Additional Low	6 \$/ton	10 \$/ton	12 \$/ton

Source: CAEP analysis presented at EAG/15

Source: ICAO