The Sustainable Materials Management Webinar Series

Carbon Credit Markets for Recycled Materials

Tuesday March 17, 2015/ 1:30 – 2:45PM ET

Presenter:

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Pennsylvania Recycling Markets Center

NRC NATIONAL RECYCLING COALITION

WE ARE RECYCLING

Overview (what to expect)

- What do we mean by carbon credits?
- Carbon credit markets
- Applicability
  - Refrigerant recycling
  - Organic residuals recycling
  - Materials recycling
- Policy consideration and opportunities

Cloud o'jargon

What do we mean by ‘carbon credits’?

(general)

Monetary value for reduced carbon emissions

Quantified
(metric tons CO2e)

Verified project-based
emissions reductions

Carbon offset credits

CRTs, VCUs, ROCs, EAOCs, CCOs

(specific)

Other GHG-related credits

- Renewable energy certificates
  - RECs
  - Green energy credits
- Renewable fuel credits
  - RINs
  - LCFS credits

Carbon credit markets

- Voluntary
  - Individuals
  - Organizations
  - “Charismatic credits”
- Compliance
  - Regulation/policy
  - Used for compliance
  - Commoditization

Voluntary markets & programs

- Ad hoc credits
  - Consultant reports
  - Verified reports

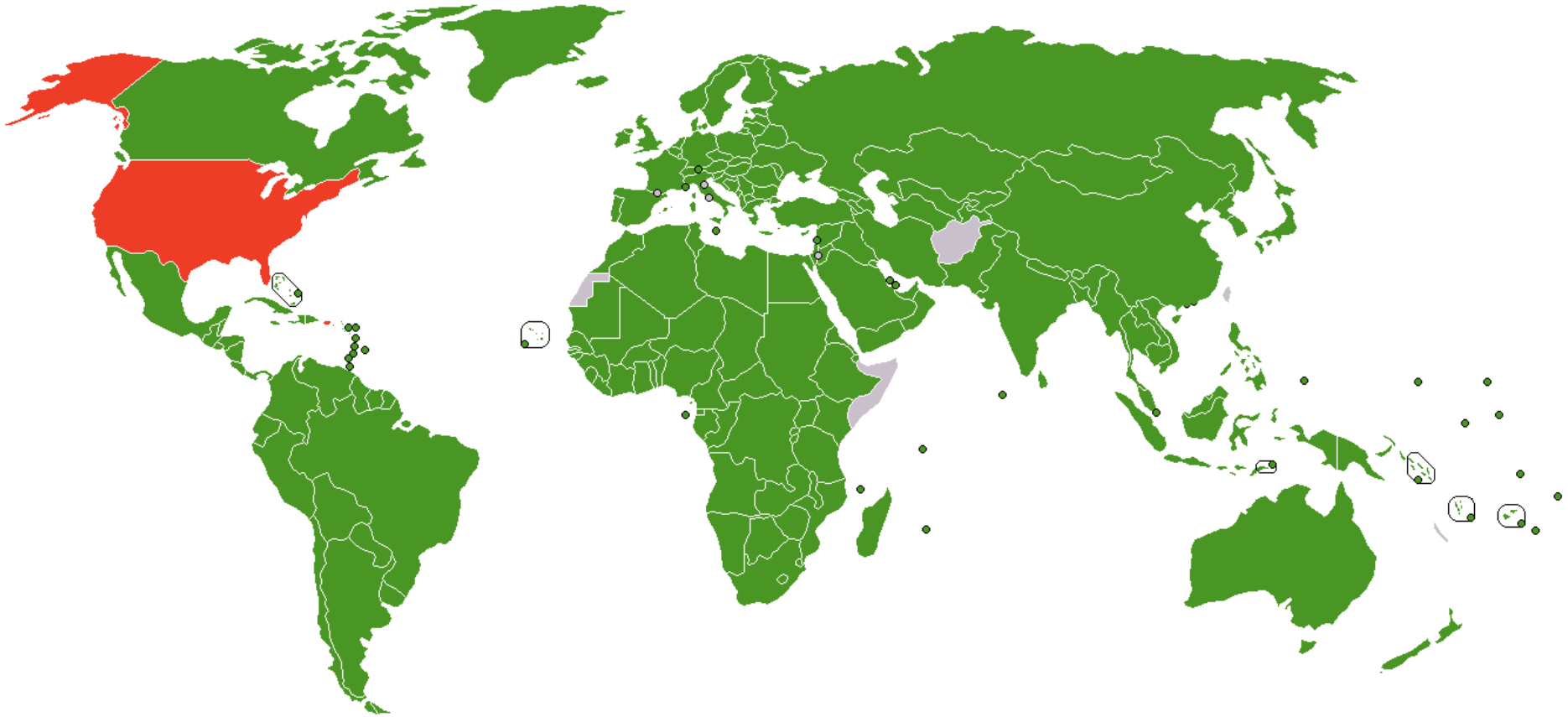
- Offset registries/programs
  - American Carbon Registry
  - Chicago Climate Exchange
  - Climate Action Reserve
  - Verified Carbon Standard

Compliance markets

- Regulation
- Cap-and-trade
- Offsets

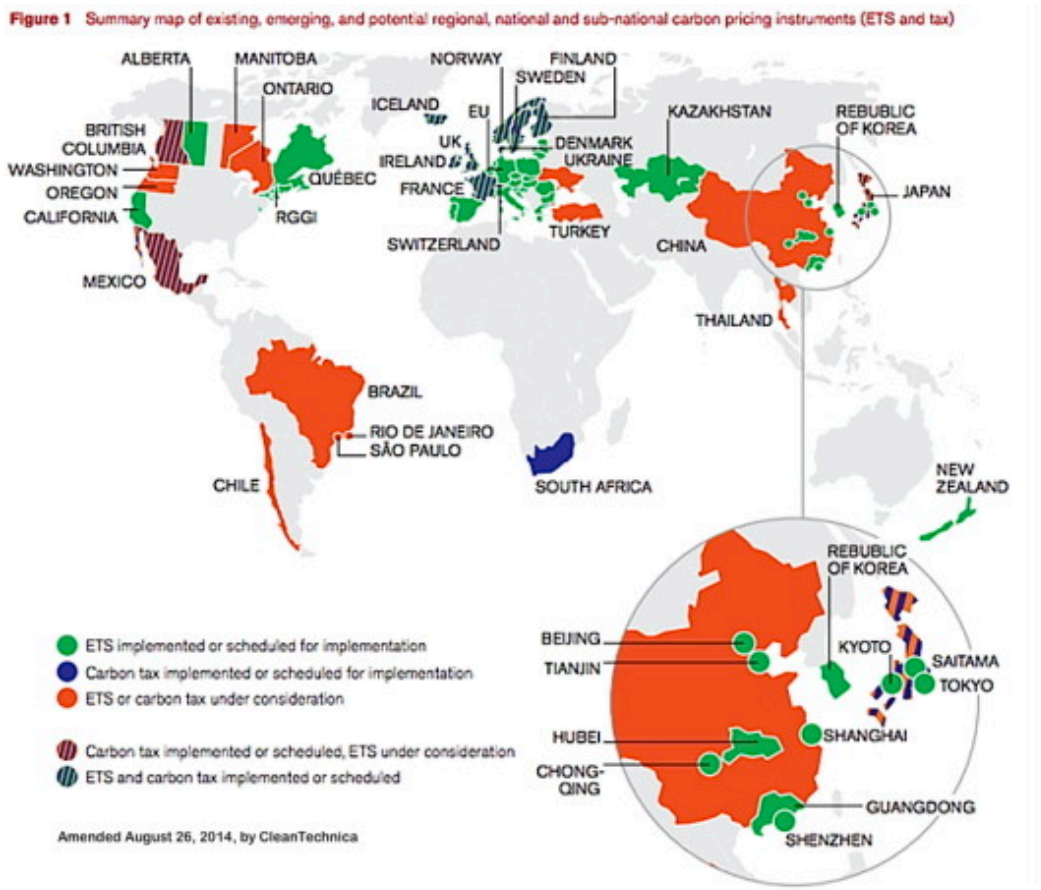
Kyoto Protocol Participation

(signed: 1997, in force: 2005)

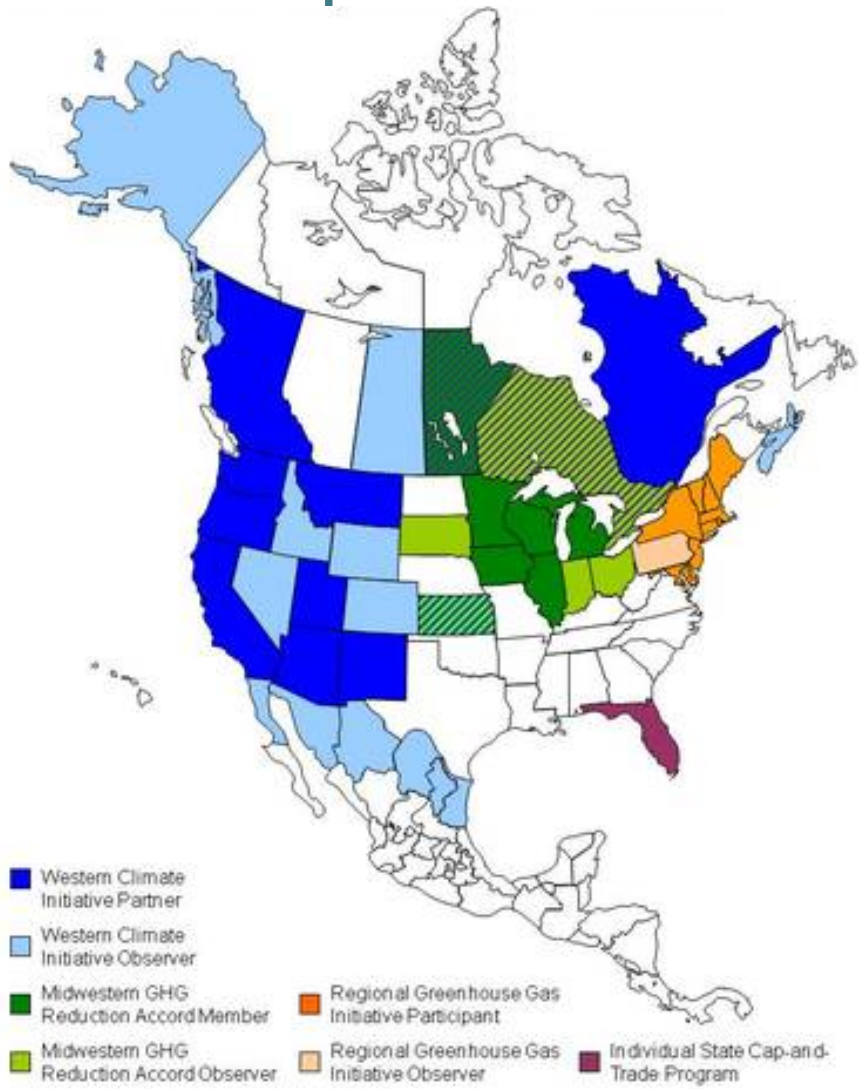


Participation in the Kyoto Protocol, as of June 2009, where dark green indicates the countries that have signed and ratified the treaty, grey is not yet decided and red is no intention to ratify.

Existing, emerging and potential regional, national and sub-national carbon schemes

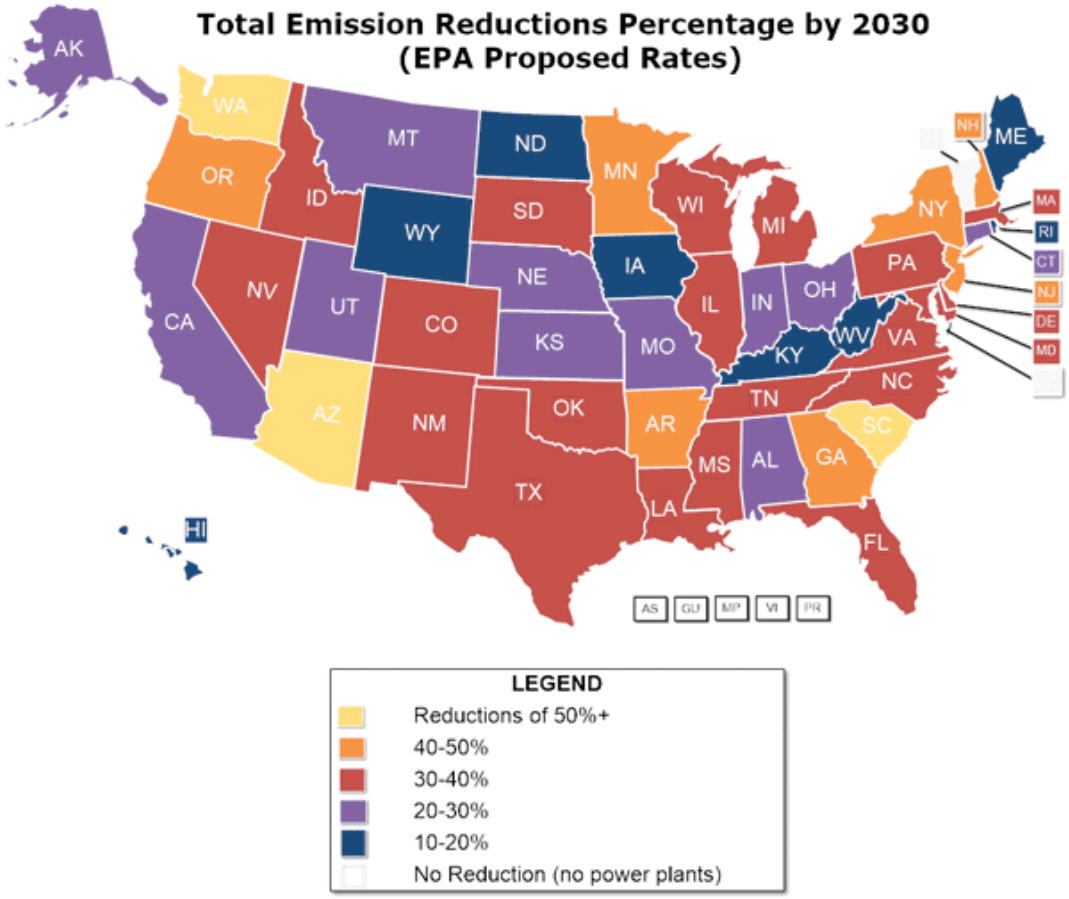


North American cap-and-trade initiatives
(2009)



Pew Center on Climate Change (~2009)

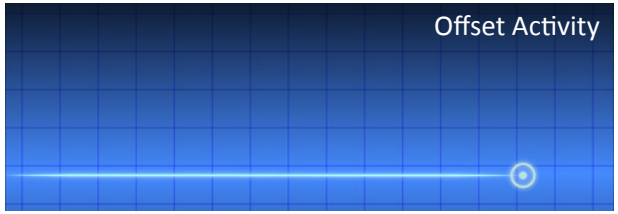
Proposed EPA GHG emissions standards



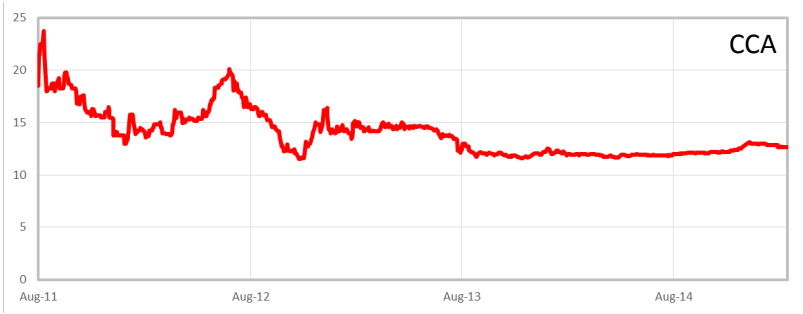
Current US compliance programs w/ offsets

- Chicago Climate Exchange
  - pseudo-compliance; ended in 2010

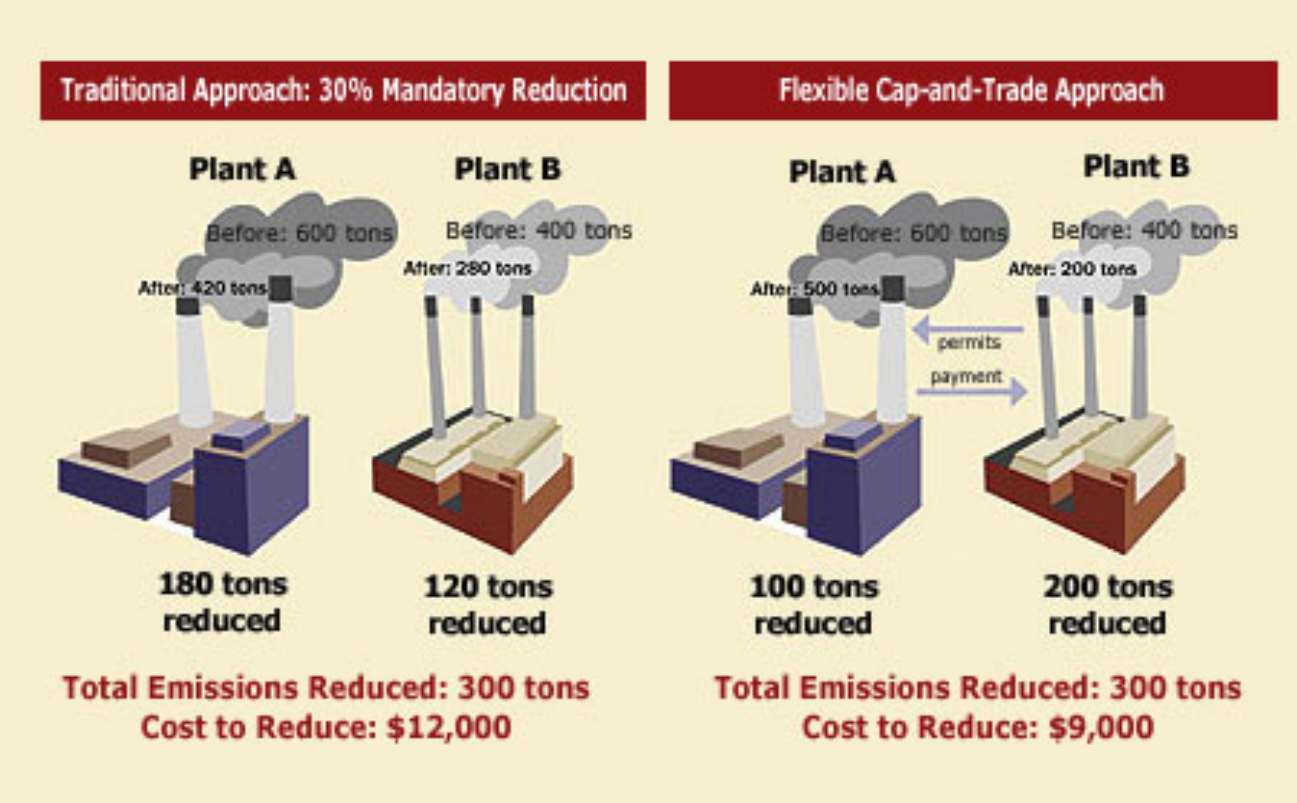
- Regional Greenhouse Gas Initiative
  - 2008; 'tightening' in 2013
  - No offsets so far



- California GHG Regulations
  - California Global Warming Solutions Act of 2006 (AB32)
  - Air Resources Board (ARB)



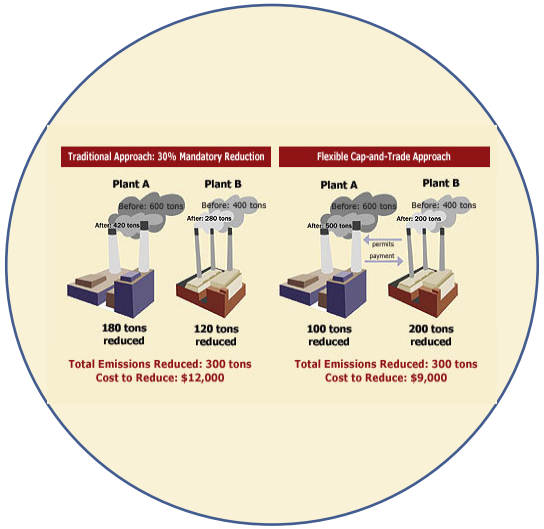
Cap-and-trade



Union of Concerned Scientists

Cap-and-trade with offsets

Regulated ('capped') sector



'Unregulated' sectors

- Agriculture (C+, CH4, N2O)
- Forestry (C+)
- Solid Waste (CH4)
- Refrigerants (ODS)

'Project-based emission reductions'

- Real, quantifiable, additional, permanent, verified, certified
- Emission reductions are NOT automatically offset credits

Common features of offset projects

- Voluntarily conducted
- Outside of regulated sector(s)
- Not required by law
- Not 'common practice'
- Current barriers to adoption
- Operate, monitor, and report according to a specific protocol
- In compliance with other regulations
- Emission reductions are *additional*
- For compliance offsets, must be an approved project type

Additionality

Q: Are emission reductions *additional* to "what would have happened" without the project?

- *Regulatory test:* Not required by law
- *Common practice test:* Not already commonly occurring
- *Financial test:* Not a 'slam-dunk' disruptive replacement technology

Otherwise, leads to double-counting and overstatement of overall net emission reductions

Calculating project emission reductions

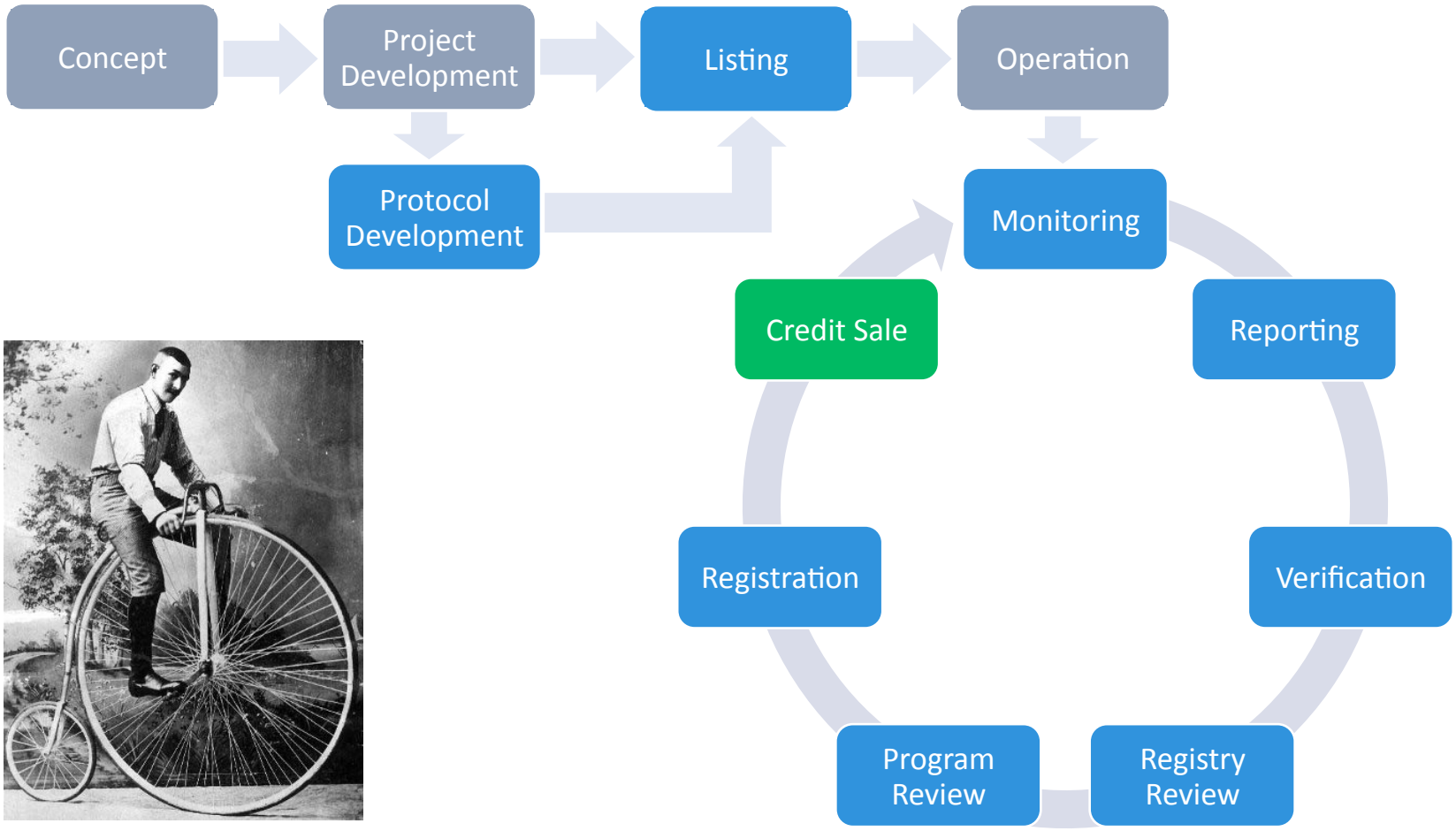
$$ER = BE - PE$$

Emission Reductions = Baseline Emissions – Project Emissions

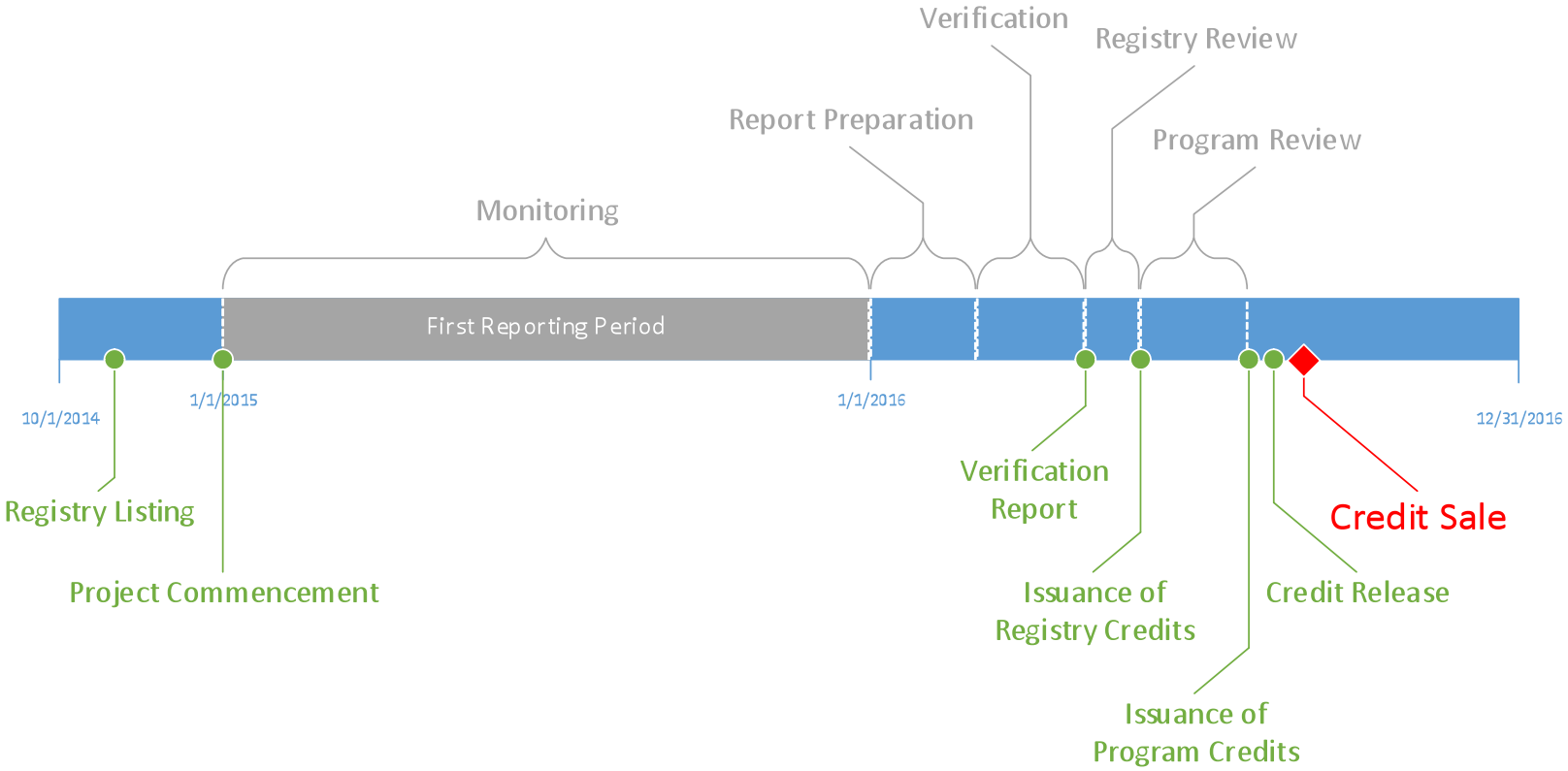
- Baseline Activity
  - 'Counter-factual' (hypothetical)
  - Direct GHG emissions
  - Fossil fuel emissions
  - Indirect emissions (grid electricity)

- Project Activity
  - Actual (monitored)
  - Direct GHG emissions
  - Fossil fuel emissions
  - Indirect emissions (grid electricity)

Offset Project Cycle



Crediting timeline



Long lead time

Cost → Return$

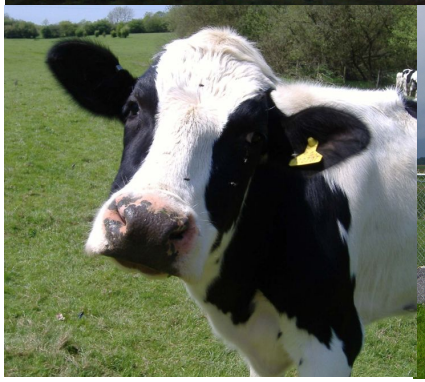
California-approved offset project types

- U.S. Forest Projects
  - Reforestation
  - Improved forest management
  - Avoided conversion

- Urban Forest Projects
  - Tree planting & maintenance

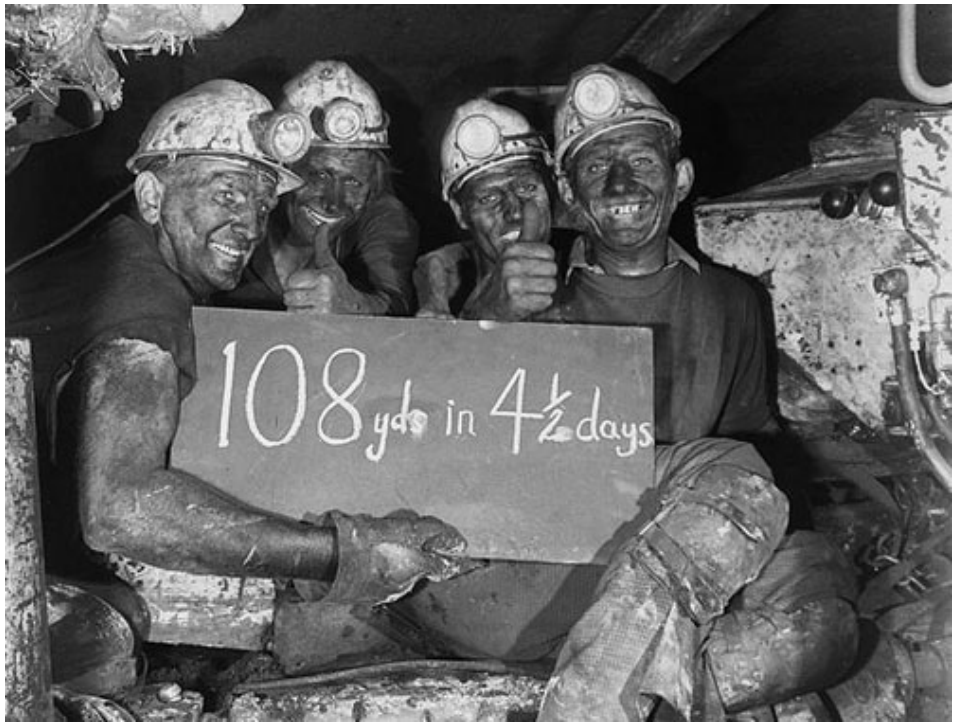
California-approved offset project types

- Livestock Projects
  - Manure methane capture & destruction



California-approved offset project types

- Mine Methane Capture
  - Coal (and trona) mine methane capture & destruction



California-approved offset project types

- Ozone Depleting Substances (ODS)
  - ODS destruction

California-approved offset project types
(summary)

1. U.S. Forest Projects
2. Urban Forest Projects
3. Livestock Projects
4. Mine Methane Capture
5. Ozone Depleting Substances (ODS)

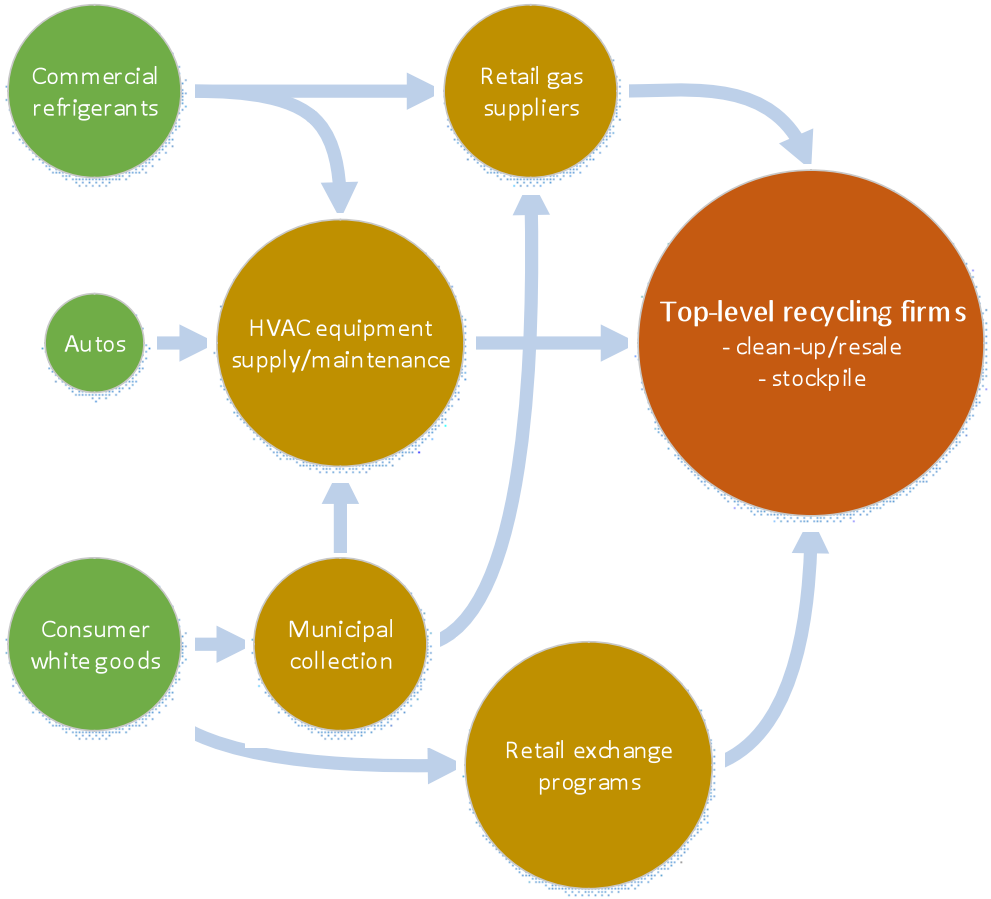
Refrigerant recycling

- Ozone depleting substances (refrigerants and foam gas)
- Recycling, stockpiling (and illegal venting) of phased-out gases leads to significant leakage and emissions
- Destruction prevents these gases from entering the atmosphere (ever)

ODS Gas	GWP (CO_2e)
CFC-11	4,750
CFC-12	10,900
CFC-13	14,400
CFC-113	6,130
CFC-114	10,000
CFC-115	7,370

Carbon offset markets have led to a radical transformation in refrigerant recycling in the US over the past 5-7 years

Refrigerant recovery pathways



ODS Destruction

A 30,000 tank of collected refrigerants at the destruction facility in El Dorado, Arkansas.

The R-12 in this tank has a GWP of 10,900 times its weight in CO2.

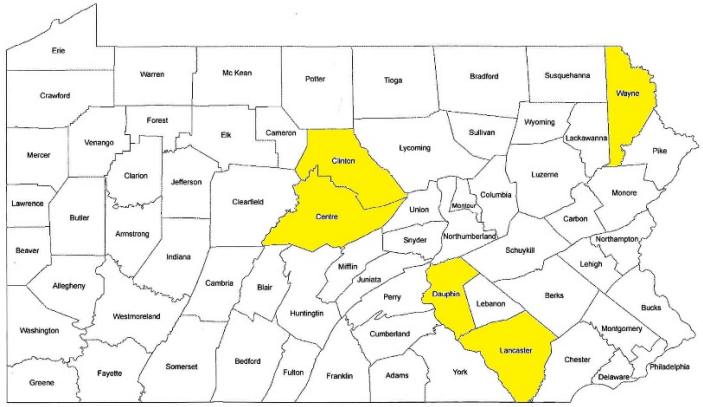
ECC clients who collect refrigerants from appliances are helping to make sure that R-12 and other refrigerant gases never escape into the atmosphere.

ARB credits issued for ODS destruction

- Credited projects: 99
- ARBOCs issued: 7,991,178

ECC Municipal Refrigerant Management Program

- Training and advice on setting up in-house refrigerant recovery
- Refrigerant recovery tanks provided free of charge and exchanged on-site as needed (a one-time refundable deposit is required)
- Proper labeling and safety information on every tank
- Refrigerant is picked up free of charge
- Royalty payments are provided to our customers based on value of collected refrigerant



ECC program benefits

- No cost disposal of refrigerants
- No need to purchase refrigerant recovery tanks and replace them over time
- No need for employees to transport refrigerants
- No expensive contractors charging $8-$14/appliance to recover refrigerants
- Allows our clients to take control of their appliance processing- recover refrigerants when you want, no need for appliances to pile up waiting for a contractor to visit the site

Organic residuals recycling

- Composting and anaerobic digestion of food waste
- Avoids landfill methane emissions

Baseline

Landfill (anaerobic)

Methane

CO_2

Project

Composting (aerobic)

CO_2

CAR Composting Protocol

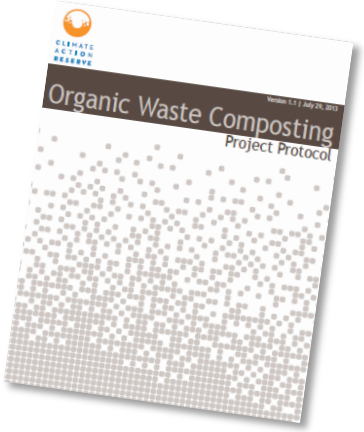
- Only food waste is eligible (not yard/wood waste)
  - Commercial Source Separated Organics (SSO)
  - Residential SSO (requires waste characterization data)
  - Co-mingled food/yard waste (requires waste characterization data)
  - MSW (factor for food waste fraction)
  - Grocery store waste requires additional documentation
  - Food processing waste is not eligible
  - Assumes baseline landfill gas collection
- Not applicable where landfill diversion is mandated
  - Accommodation for local mandates 'in conjunction' with composting programs

Monitoring

- Individual scale transactions
  - Weight
  - Waste category
  - Jurisdiction
  - Specific source/location
- Process monitoring data
  - Tip pad/facility residence time
  - Compost process type and optional practices
  - Batch temperatures & turning frequency
  - Biofilter design and maintenance
- Regulations/Permits/NOVs

Baseline calculation

(some math required)



$$BE_{FW,S} = 0.9 \times \left[W_{T,S} \times FC_S \times F_{FW,S}\right] \times (1 - WTE_S) \times \rho \times \left[\sum_{x=1}^{10}\left[e^{-k_{FW,S}(x-1)} \times \left(1 - e^{-k_{FW,S}}\right) \times \left(1 - (GC_S \times LCE_x)\right)\right] \times (1 - 0.1)\right] \times 21$$

Composting/AD credits to date (CAR)

Project Type	Project Name	Location	Project Developer	Credits Registered
Composting	Cedar Grove - Maple Valley OWC Composting Project	King County, Washington	Environmental Credit Corp.	160,879
Composting	Cedar Grove Composting	Everett, Washington	Environmental Credit Corp.	61,929
Composting	Peninsula Composting	Wilmington, Delaware	Environmental Credit Corp.	70,316
Composting	Z-Best Food Waste Composting	Gilroy, California	Environmental Credit Corp.	42,649
Anaerobic Digestion	Washington Beef LLC Greenhouse Gas and Solids Reduction Project	Yakima County, Washington	Washington Beef, LLC	19,515

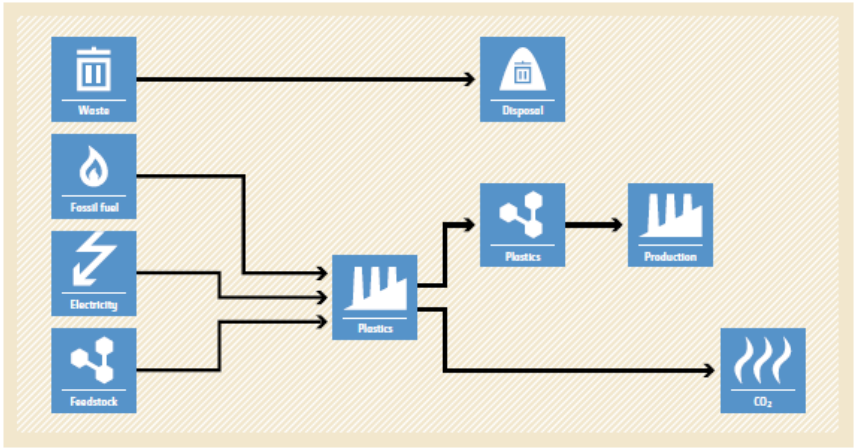
‘Hard’ Materials Recycling

- Metal, paper, plastic, glass
- Not likely to be applicable for offset credits in the US
  - Indirect emissions reductions from reduced lifecycle energy use
  - Regulated sector (electricity, fossil fuels)
  - Common practice (for decades)
  - Recycling mandates in most states

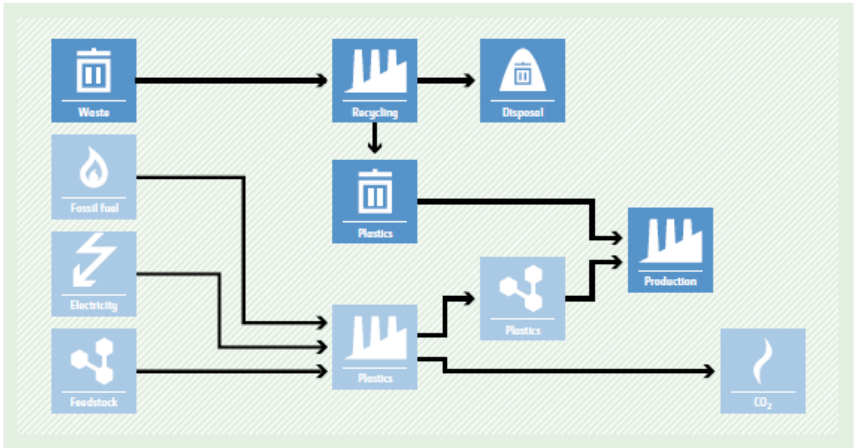
CDM protocol (for developing nations)

- AMS-III.AJ. Recovery and recycling of materials from solid wastes

BASELINE SCENARIO
HDPE, LDPE and PET/PP are produced from virgin raw material resulting in high energy consumption.



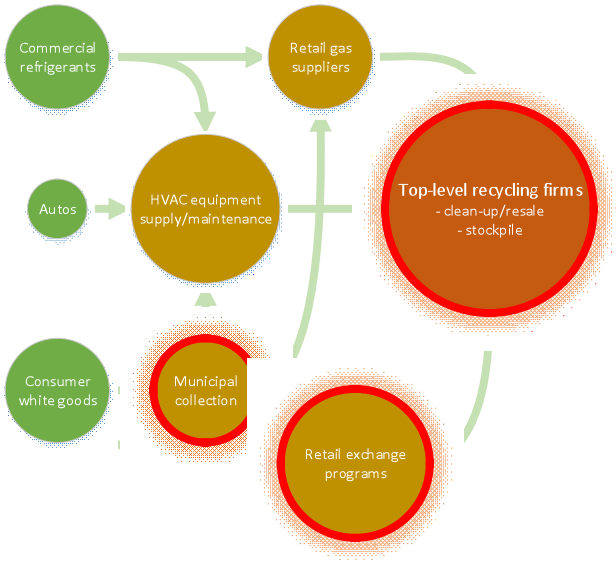
PROJECT SCENARIO
Production of HDPE, LDPE and PET/PP based on virgin raw material is reduced. Use of recycled material results in less energy consumption.



Policy considerations/opportunities

Refrigerant Recycling

- Some types of recycling activities (refrigerant recovery and destruction) have seen major transformations as a result of carbon credit programs and markets



Policy considerations/opportunities

Organic residuals recycling

- Carbon credits for organics recycling (of food residuals) have so far provided incentives for a few very large composting facilities
- Complicated protocols and high transaction costs have limited the reach of food residual diversion incentives to smaller facilities
- State and local food residual diversion mandates reduce/eliminate the opportunity for carbon offset credits

Policy considerations/opportunities

Materials recycling

- 'Hard' materials recycling (metal, paper, plastics, glass) is not likely to be eligible for traditional carbon offset incentives

Policy considerations/opportunities

- Additional regulations appear imminent
- Carbon offset credits are not the only possible way of monetizing the reduced carbon value of project activities
- The ability to credibly quantify GHG emission reductions (or reduced carbon intensity) from specific projects or products may still be of value for other incentive programs:
  - Infrastructure grants
  - Performance grants
  - Tax breaks/credits
  - Favored purchasing
  - 'Internalized' emission reduction programs

QUESTIONS?

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