Karbone

Environmental Market Value of Agricultural Methane

About Karbone

Karbone is a full service firm specializing in renewable energy and environmental markets. We offer integrated **brokerage**, **project finance**, **research** and **advisory** services to a wide range of market participants. This unique combination of services all under the same roof ensures that we add real value to our clients' projects along each segment of the project lifecycle.

From our offices in **New York**, London, and Istanbul, and strategic partnerships in **California**, **Canada**, South America, and China, our range of project experience spans across nearly every relevant environmental market around the globe.

Recent Awards

#1 US Voluntary Carbon Offset Broker
#2 US Renewable Energy Credit Broker
#3 US Biofuels Broker
-Energy Risk Magazine

Top North American Carbon Broker
-World Finance Magazine

Top 10 Sustainability Consultant
-Verdantix

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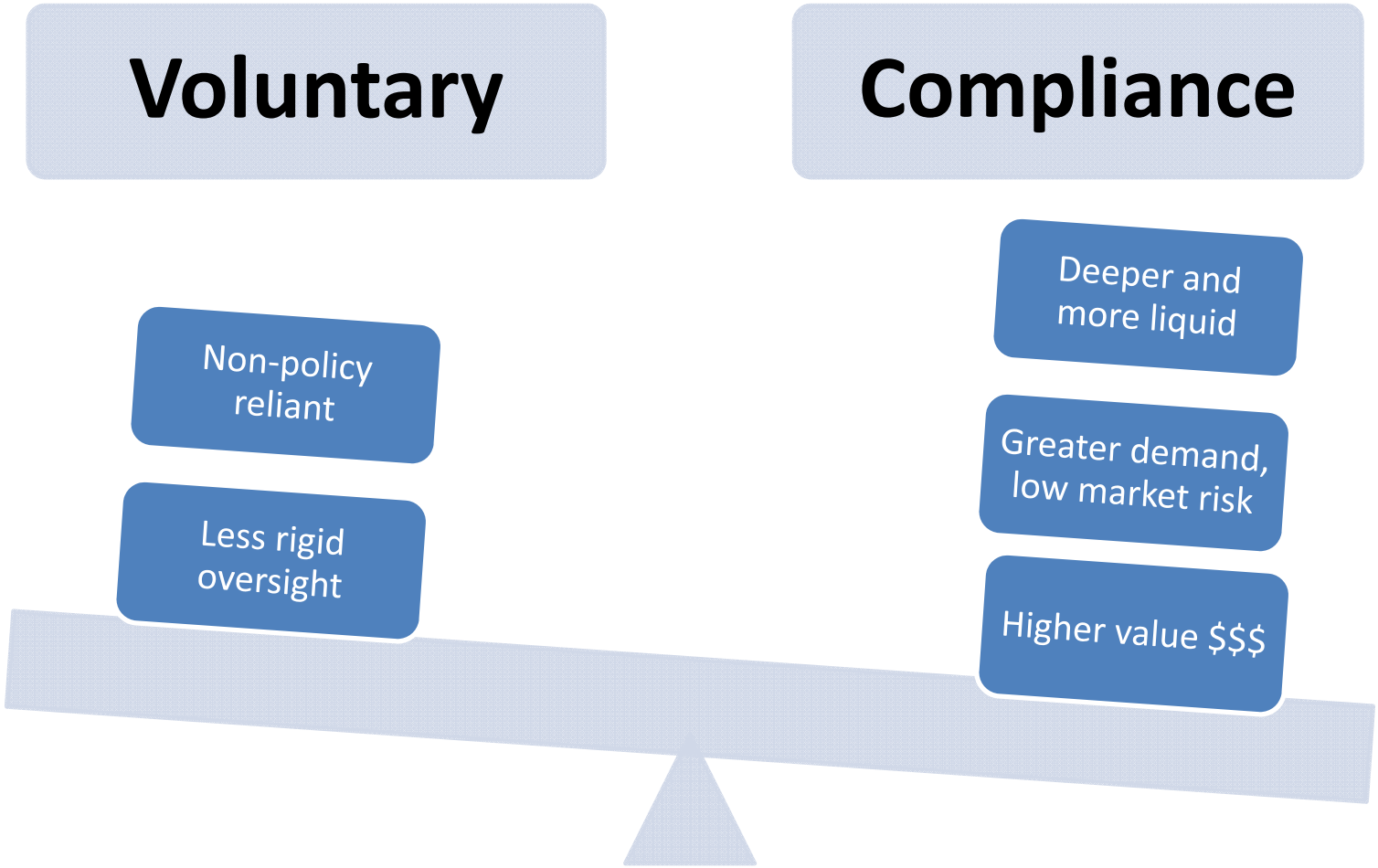
Our Role in Carbon

Early stage market advisory and project financing

Mid-stage carbon development management and carbon financing

Commercial-stage marketing and sales of carbon and other commodities

Carbon Markets



Plus some other topics…

Thanks to Point Carbon for data

California AB32 Program

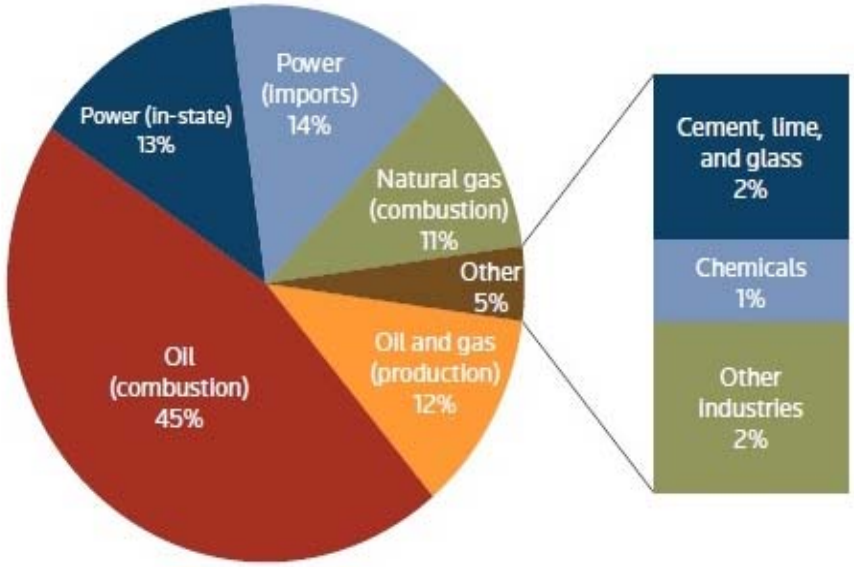
- AB32 will establish the total amount of GHG emissions that major sources in California are allowed to emit. Air Resources Board (ARB) will distribute tradable allowances to emit GHGs. Each allowance permits the holder to emit **one MTCO2e** of GHG.

- Entities emitting more than **25,000 MTCO2e** per year are covered by the program, to be phased into the program based on industrial type.

Phase in Year	Industry Type
Phase I: 2013	Electricity generation (including imports)
	Large stationary sources: refineries, cement production facilities, oil and gas production facilities, glass manufacturing facilities, food processing plants, etc.
Phase II: 2015	Transportation and other fuel providers
	Natural gas providers
	Combustion of other fossil fuels not covered directly at large sources in the initial phase of the program

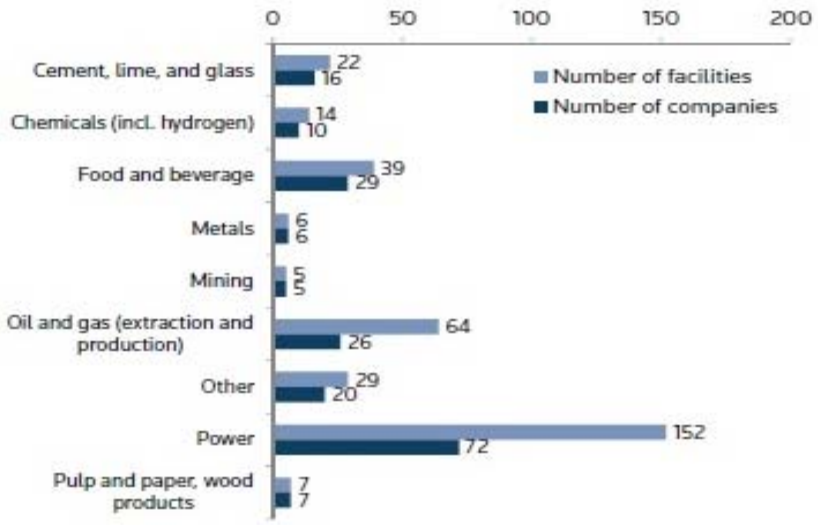
Covered Entities

Figure A: Breakdown of California's 2010 covered emissions by sector. Total ~ 370 Mt



Source: Point Carbon

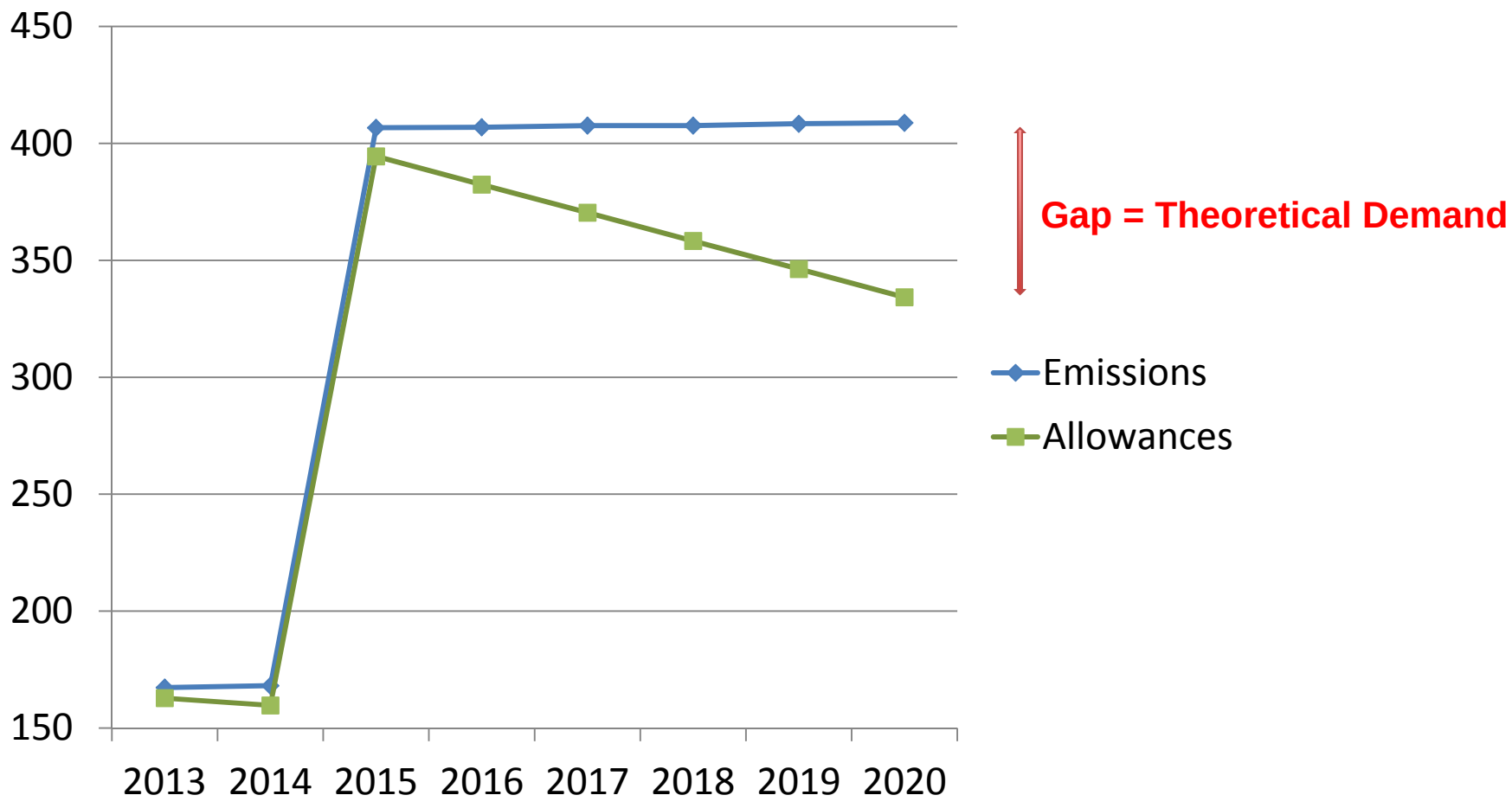
Figure B: In-state facilities by sector



Source: Point Carbon

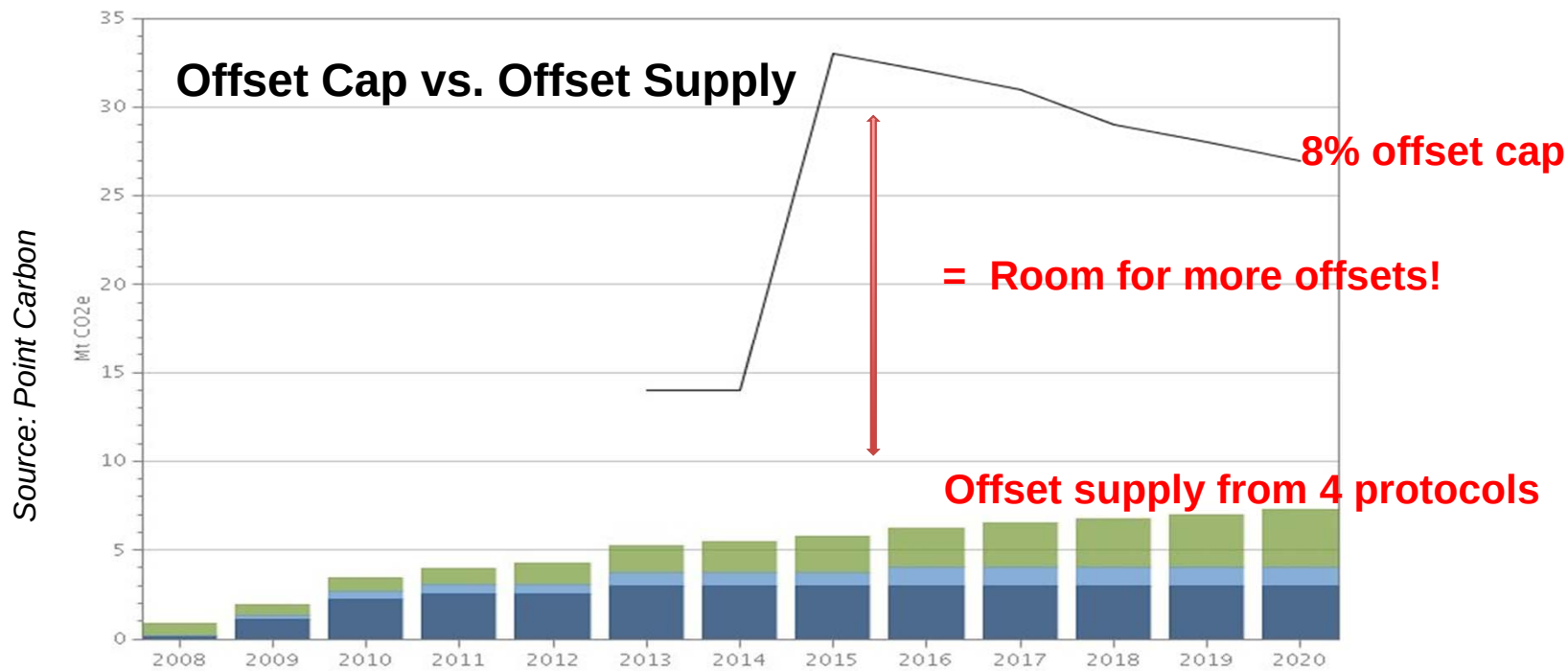
- Of the 600 facilities who currently report their GHG emissions in CA, **over 300** emitted above the 25,000 ton threshold in at least one year between 2008-2010, making them covered entities. These facilities are in turn owned by at least **186 companies** operating in-state facilities. In addition, about **50 more companies** import power into California and thus face an obligation. **A few other oil and gas firms** who do not own production/refining facilities in-state will join in 2015.

Supply/Demand: Allowances



Supply/Demand: Offsets

- To satisfy their required program reductions, regulated emitters may use allowances and a set proportion of **offset credits** created by pollution cuts from unregulated sources. A maximum of **8 % of a regulated entity's compliance obligation** can be met using offsets.
- The four initial ARB offset protocols cover: 1) forestry; 2) urban forestry; 3) removal of ozone-depleting substances; **4) agricultural methane.**



Source: Point Carbon

Offset Demand Gap

Table 1: Offset supply and demand by compliance period, all volumes in Mt

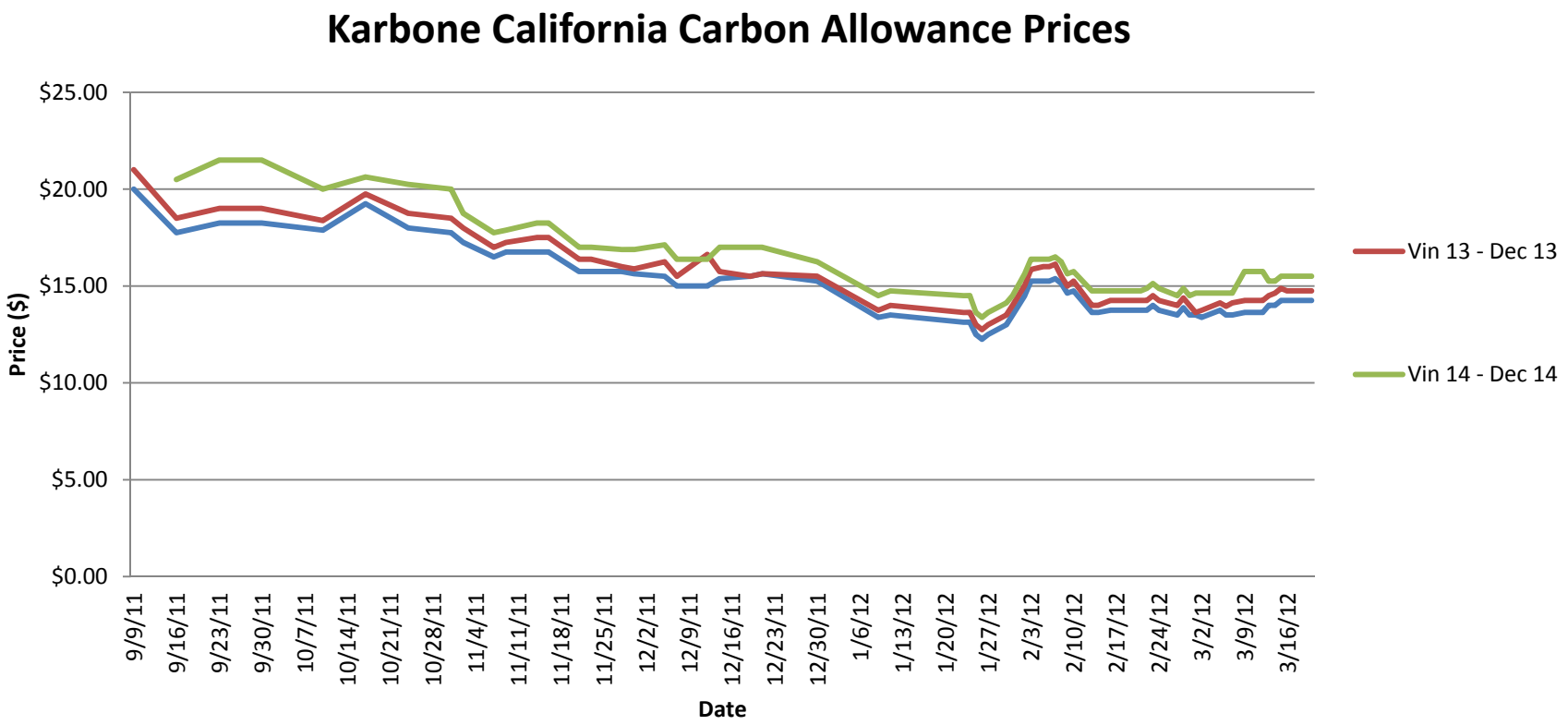
Year	2013	2014	2015	2016	2017	2018	2019	2020
Net cap	160	157	378	366	355	332	321	310
Emissions	162	161	383	378	373	368	362	357
Offset quota	14	14	33	32	31	29	28	27
Sectoral offset quota	4	4	8	8	8	15	14	14
Offset supply*	20	6	6	7	8	9	10	10
Theoretical offset shortage	-6	9	27	25	23	20	19	17
Period shortage	3		75			56		

*2013 supply volumes include projected early offset credits. Volumes are for the four currently approved protocols and REDD

Source: Point Carbon

Pricing and Market Dynamics to Date

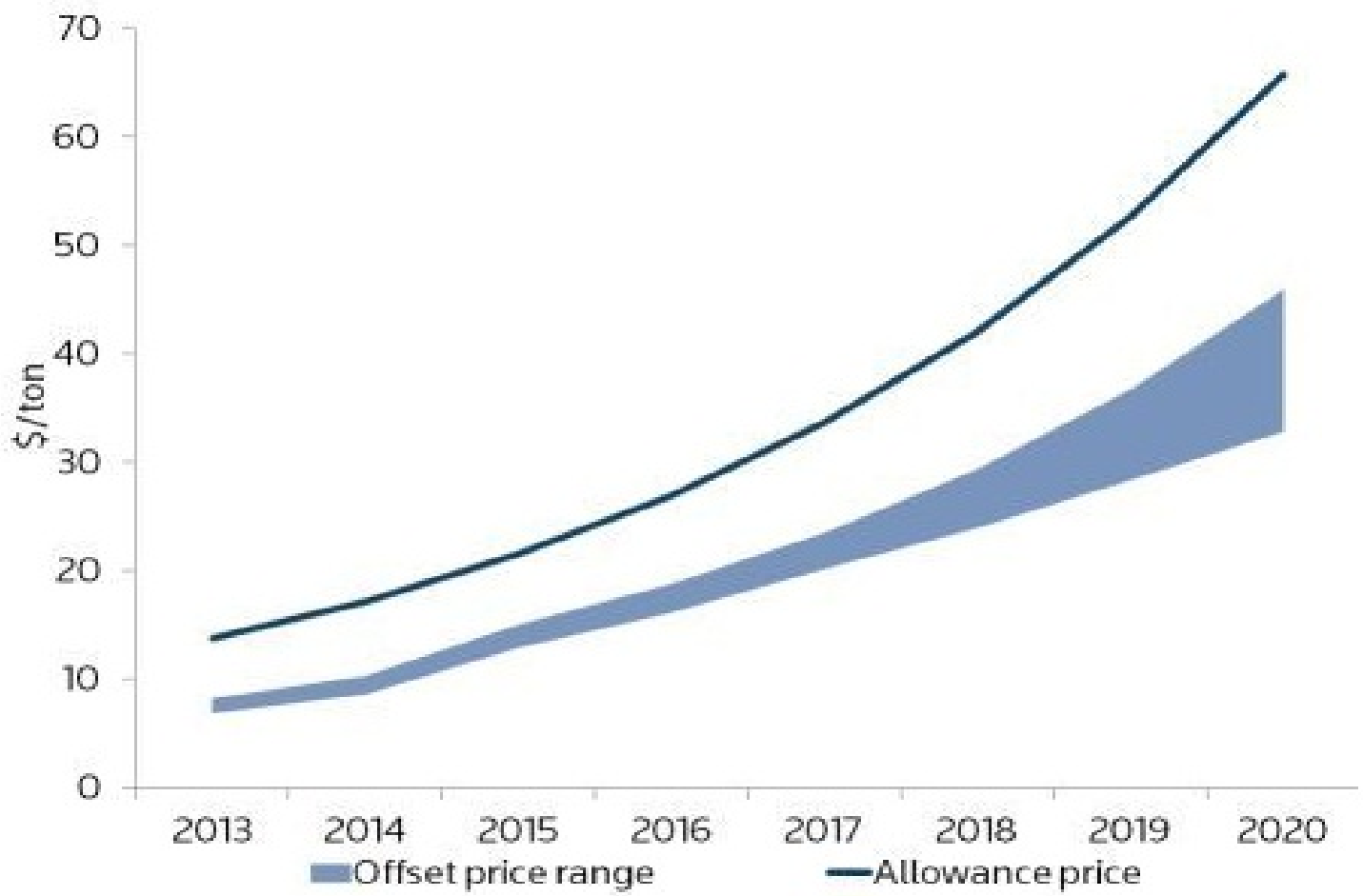
- Industry rule-of-thumb is that offsets trade at a 25-50% discount to allowances.
- Offsets trade at a discount due to the 8% limit on offset use and the risks from buyer liability for revoked offsets. This discount varies as credit supply and demand fluctuate, and also across risk profiles of different offset types.



Pricing Forecasts

- Forecasted Offset Pricing
  - CP1: $6-12
  - CP2: $12-25
  - CP3: $25-48

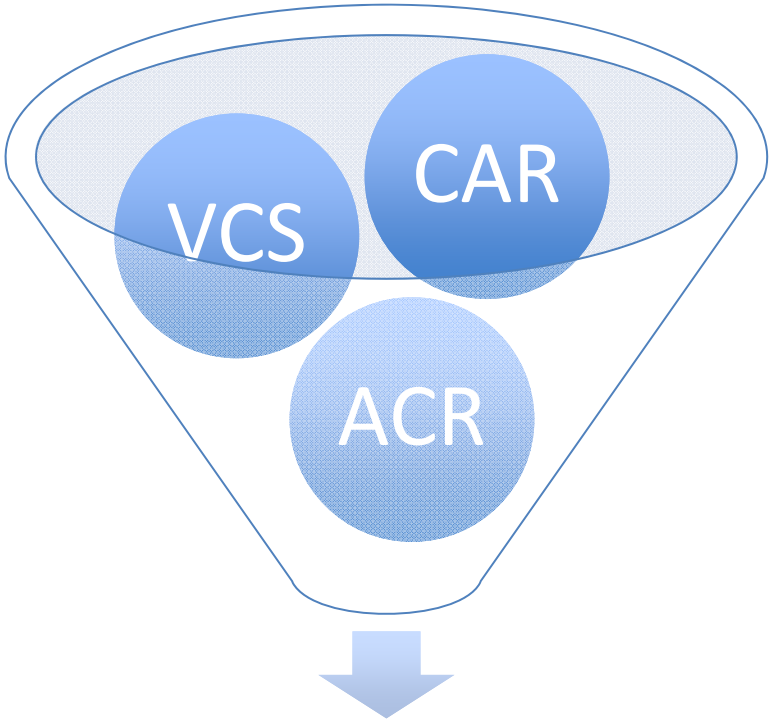
Figure 1 – Our allowance price forecast vs. expected offset price ranges in 2013-2020



Source: Point Carbon

Alternative Value: Voluntary Market

- Three major voluntary programs in the US
- $ value anywhere from $1 -3 for more generic or industrial projects, $3 -7 for more socially charismatic projects
- 3 major types of buyers:
  - Wholesale and retail carbon aggregators
  - Corporate and non-profit CSR or “mission” buyers
  - Speculators for compliance carbon



Backstop to compliance carbon value

Additional Value Drivers

Power

- Renewable power generation
- Biogas export
- Renewable energy credits (RECs)

Land and Soil

- Tipping fees for receiving waste manure
- Soil amendments created by treating digestate

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