

Renewable Natural Gas 101

Renewable Fuels Symposium April 2022



ameresco.com

Four blue pencils are arranged diagonally on a light green background. The pencils are sharpened and have a blue paint finish. The background of the slide is a dark blue gradient with a thin orange horizontal line.

Agenda

- Introduction
- What is RNG?
- RNG in the Transportation Sector
- How to add RNG to your Portfolio
- Procurement Contracting Models
- Grant
- Making it Happen

Ameresco's Advanced Technology Portfolio

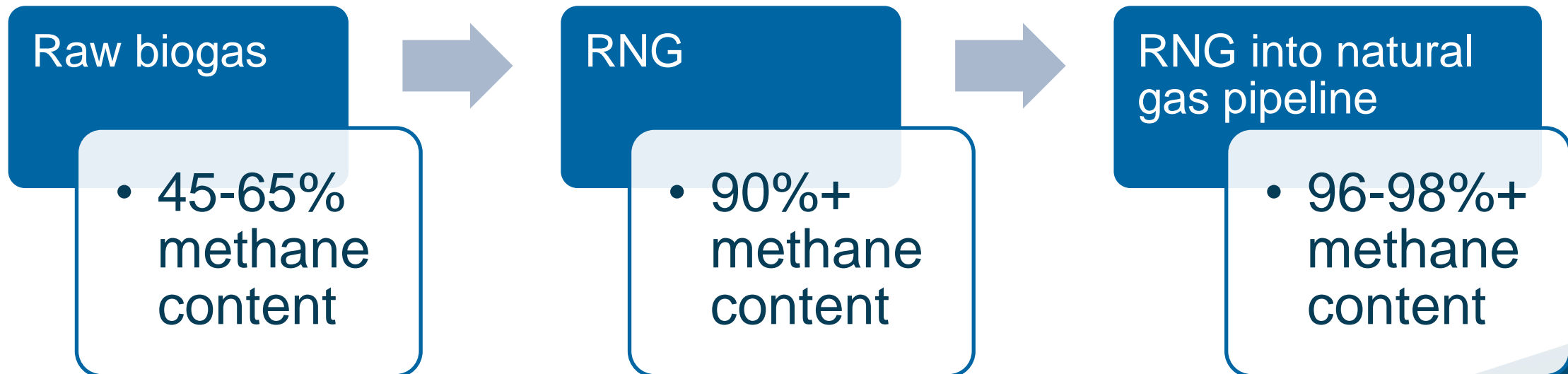


What is RNG

Renewable Natural Gas (RNG) \approx methane (CH_4) \approx fossil Natural Gas (NG)

Renewable Natural Gas (RNG): anaerobically-generated biogas that has been cleaned and refined to natural gas standards

Biogas: the byproduct of anaerobic decomposition of organic waste



Waste Types Used to Make RNG

Municipal Solid Waste



Sewage Sludge



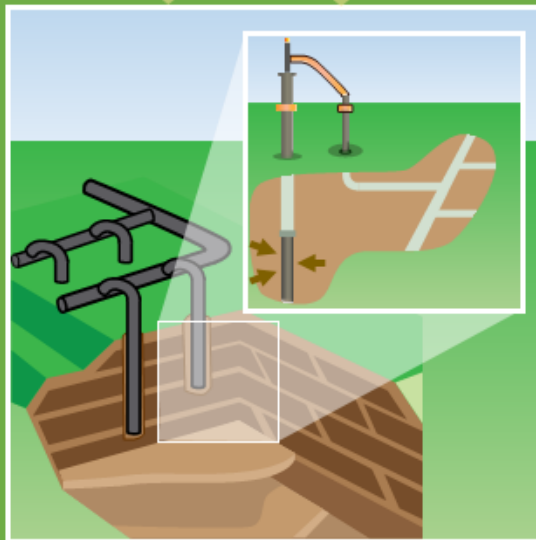
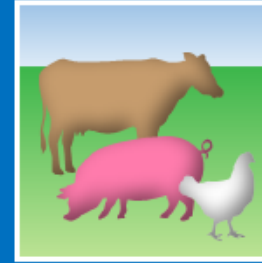
Yard and Crop Wastes



Food and Food Processing Wastes



Manure

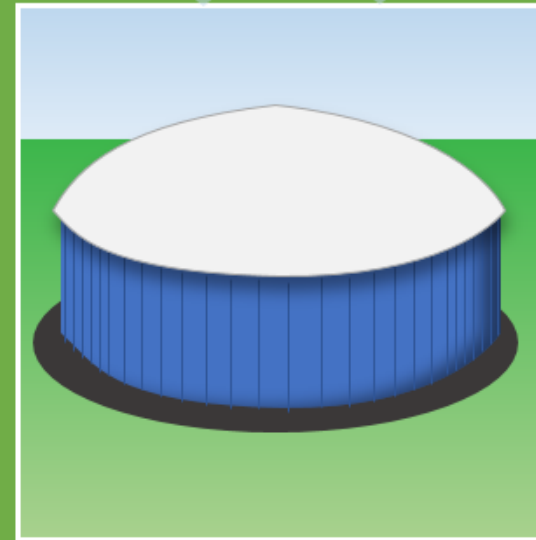


Landfills

Biogas made from organic sources through anaerobic processes contains 45–65% methane.

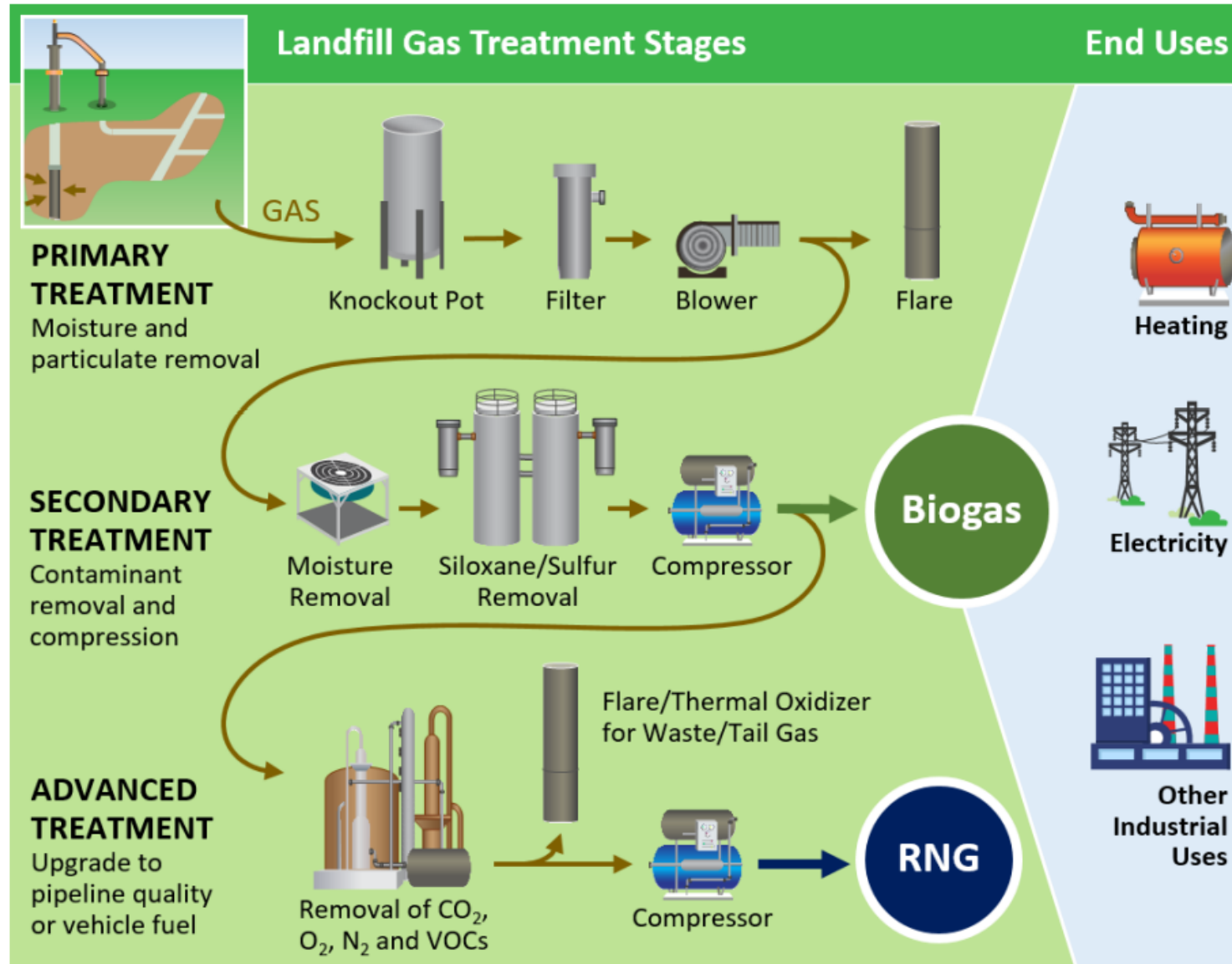
Biogas is treated to remove moisture, particulates, contaminants and other gases (CO_2 , O_2 , N_2 and VOCs); this increases the methane content to 90% or greater—typically 96–98% for pipeline injection.

The resulting product is **renewable natural gas (RNG)**.

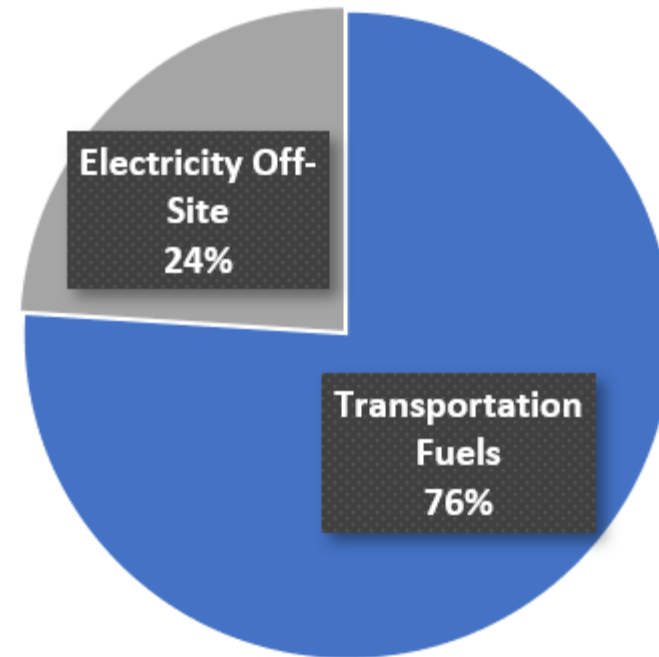
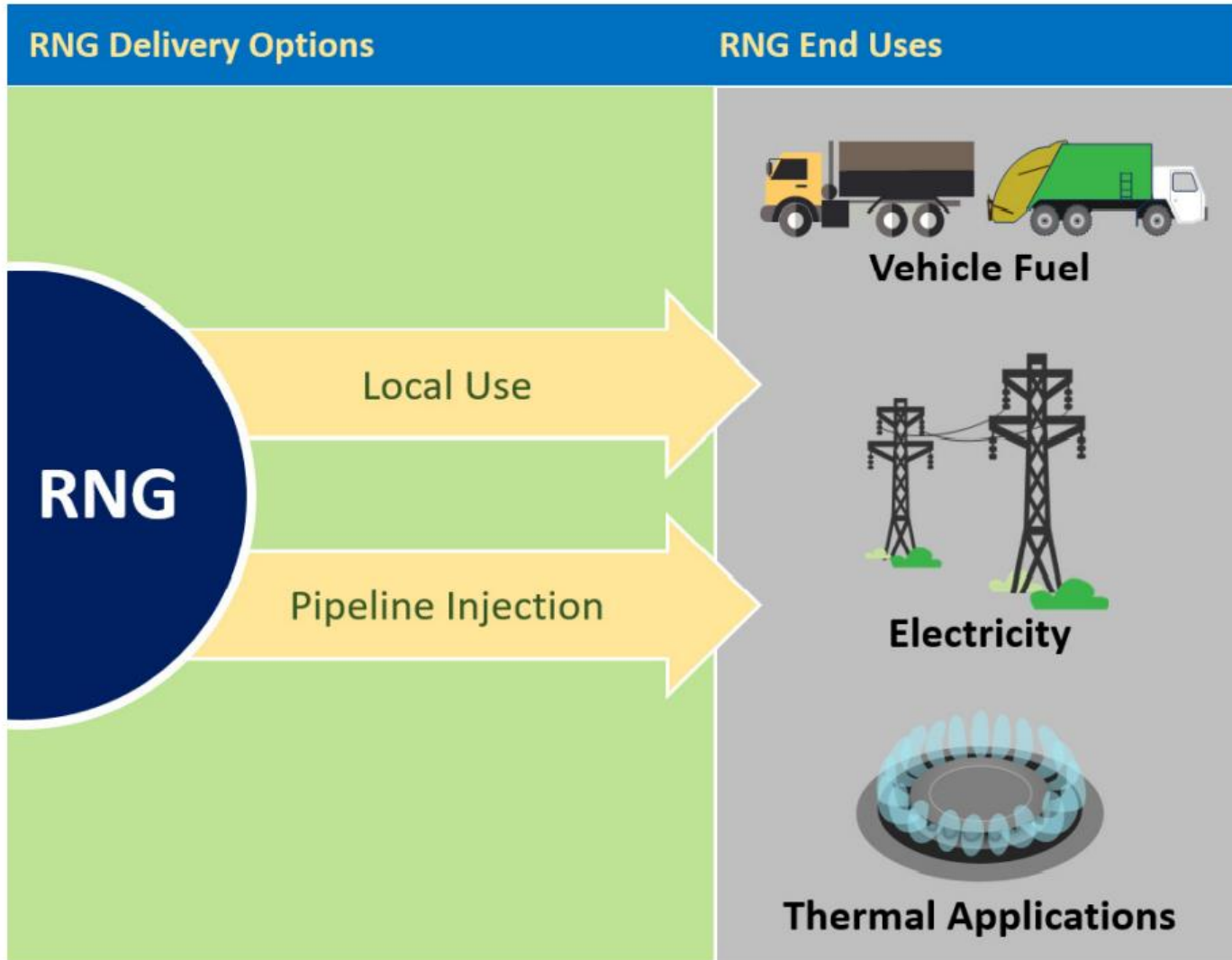


Anaerobic Digesters

Example: The Path to RNG

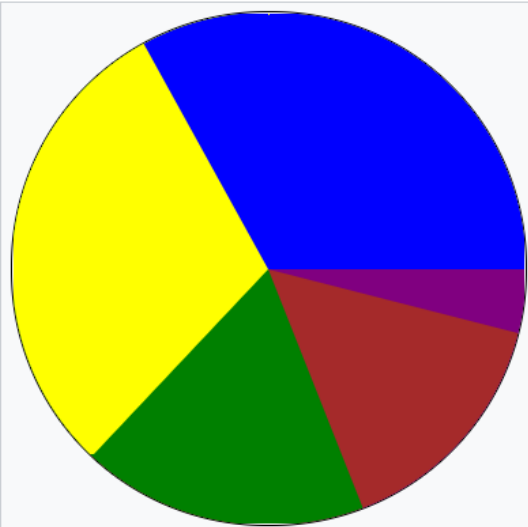


RNG End Uses

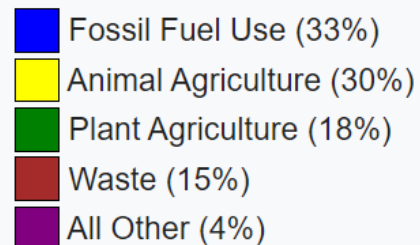


2017 RNG Usage

How RNG Lowers GHG Emissions



Sources of methane emissions due to human activity:
year 2020 estimates ^[1]



- Methane is ~28x more potent at trapping heat in the atmosphere than carbon dioxide
- RNG is considered carbon-neutral under best-practice carbon accounting methodologies
- RNG provides further benefits when used as a fuel for natural gas vehicles because they tend to have lower carbon emissions than petroleum-based vehicles



Transportation Sector



Transportation Sector–Renewable Fuels Standard (RFS)

- RFS is a federal program that requires a certain volume of renewable fuel to replace or reduce the quantity of petroleum-based transportation fuel in the U.S
- RNG qualifies as a renewable fuel under the RFS program and can generate Renewable Identification Numbers or “RINs”
- In 2018, 32% of all on-road fuel used in natural gas vehicles (NGVs) was RNG



Transportation Sector – the Numbers

- Vehicle Fuel RNG can be used as:
 - compressed natural gas [CNG]
 - or liquefied natural gas [LNG]
- March 2020, 91% of LFG-sourced RNG pipeline injection projects were providing at least a portion of the RNG to a vehicle fuel market down the pipeline!



Transportation Sector – Onsite Vehicle Fuel

Opportunities

- Avoids the need to meet natural gas pipeline specifications
- Avoids the costs to interconnect and transport the gas via pipeline

Challenges

- Must be an adequate and consistent demand for the RNG vehicle fuel. Matching the fleet demand to the RNG resource can be problematic in some rural areas with a source of biogas, as larger fleets are generally located in urban centers

Benefits of RNG Vehicles

- New Natural Gas Vehicles (NGV) are cleaner than alternatives
- NGV fuels reduce GHG emissions
- RNG is ideal for GHG reduction
- Low operating costs
- Proven technology
- Quiet



How to add RNG to your Portfolio



RNG Project Developers & Suppliers

Companies that **develop** and **operate** RNG facilities and **sell** RNG

Bring engineering expertise to build high-performance RNG plants and/or fleet conversion

Allows Clients to be flexible and shift as little or as much of the:

- Development risk
- Operational burden



Energy Traders & Marketers

A host of energy trading and marketing firms serve as a bridge between the output from RNG projects and potential customers

These firms ensure compliance with the RFS, LCFS, and other programs



Natural Gas Utilities

Several natural gas utilities across the U.S. and Canada have started to offer RNG incentives to their customers

- **SoCalGas** offers an incentive for customers with RNG production potential in which SoCalGas builds, owns, operates, and maintains a biogas conditioning and upgrading facility on a customer's behalf which is repaid through their utility bill
- **NW Natural** (Oregon) built an RNG vehicle filling station at one of Portland's wastewater treatment plants that is providing the City of Portland with revenue each year while reducing the carbon intensity of vehicle transportation in the city

Additionality in RNG Procurement

Additionality - concept that an organization plays a proactive role in developing new carbon-reduction projects that would not have come to fruition via business-as-usual

This is expanding into RNG and playing a role in financing and/or developing a new RNG project can provide RNG buyers with the ability to claim additionality.



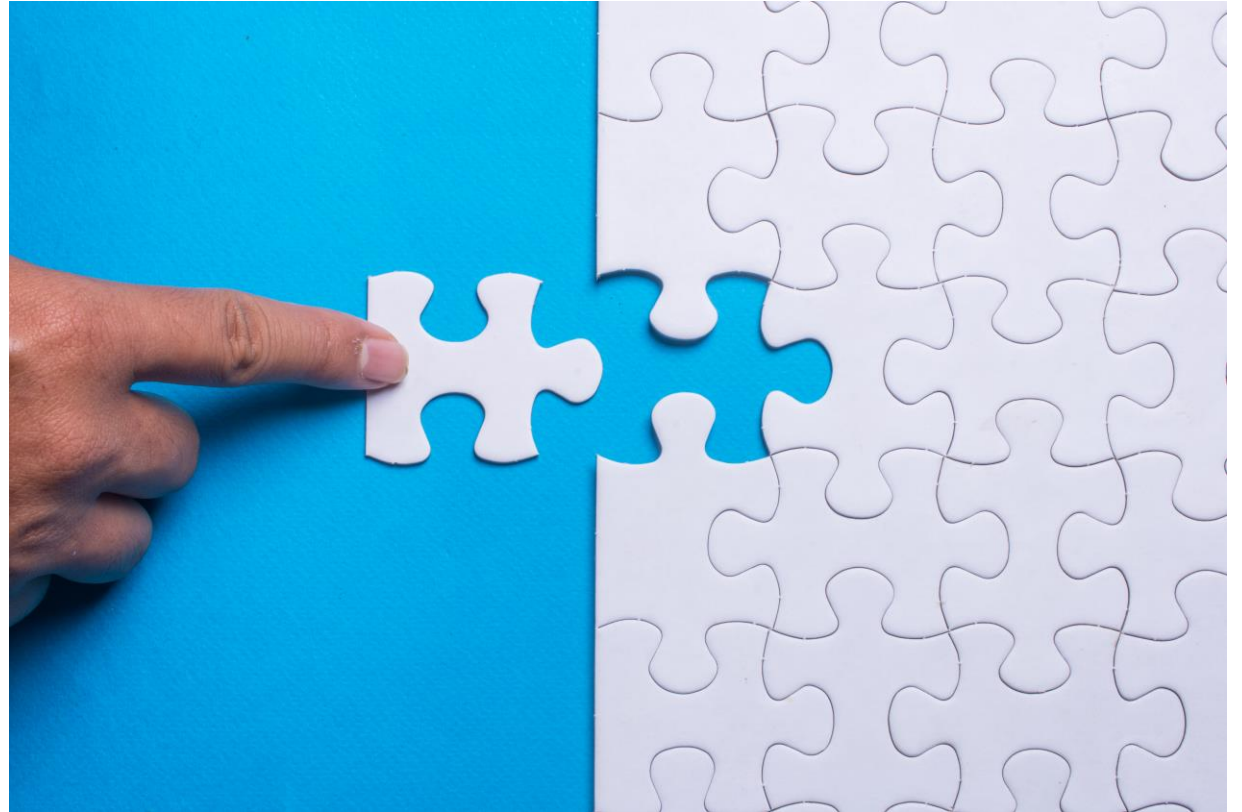
Procurement Contracting Models



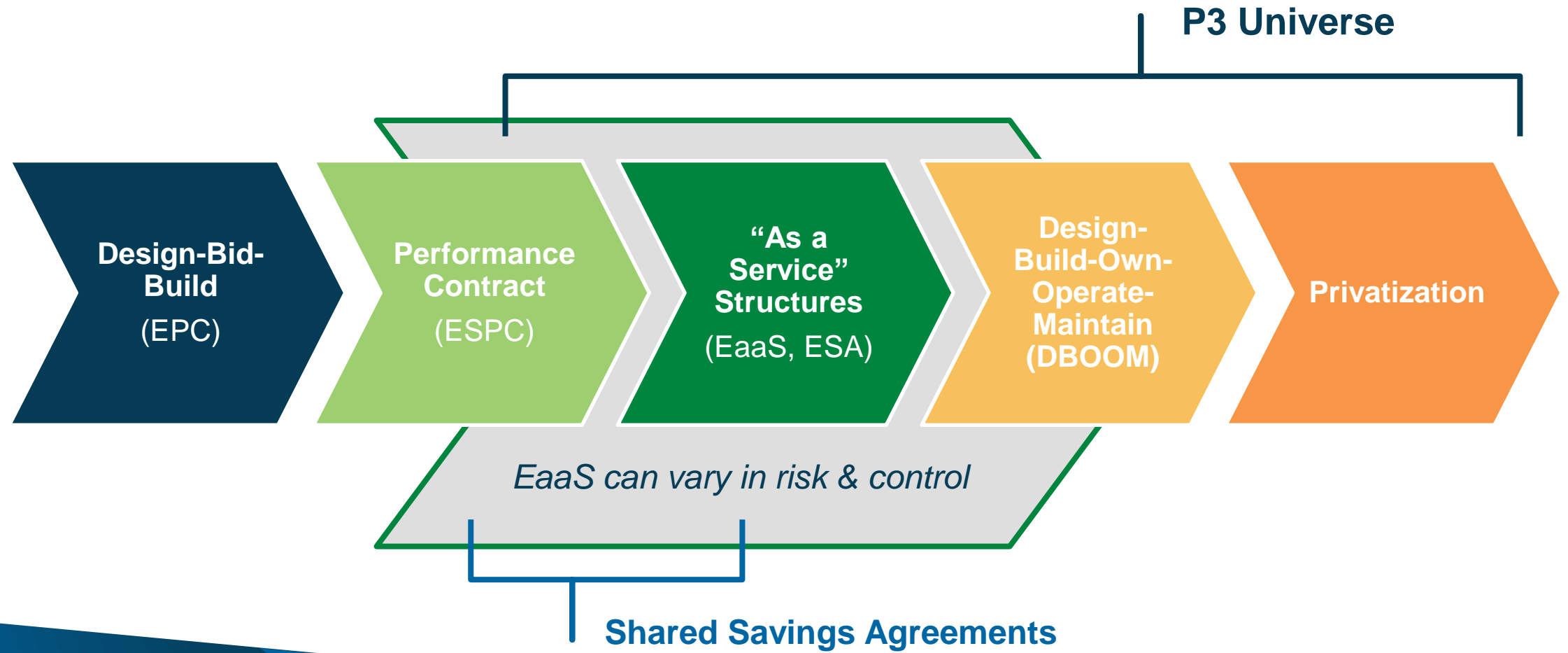
Procurement: Finding the best Fit

You have a project ...

- What are key needs?
- What are you staffed for?
- What about risk?

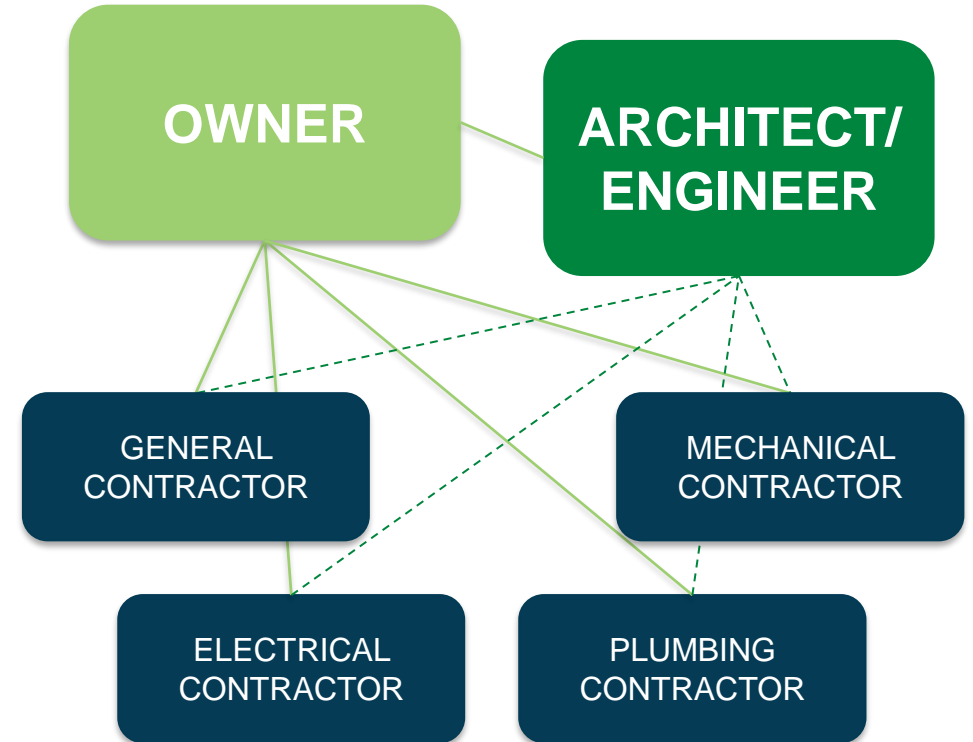


Level of Risk Transfer and Control

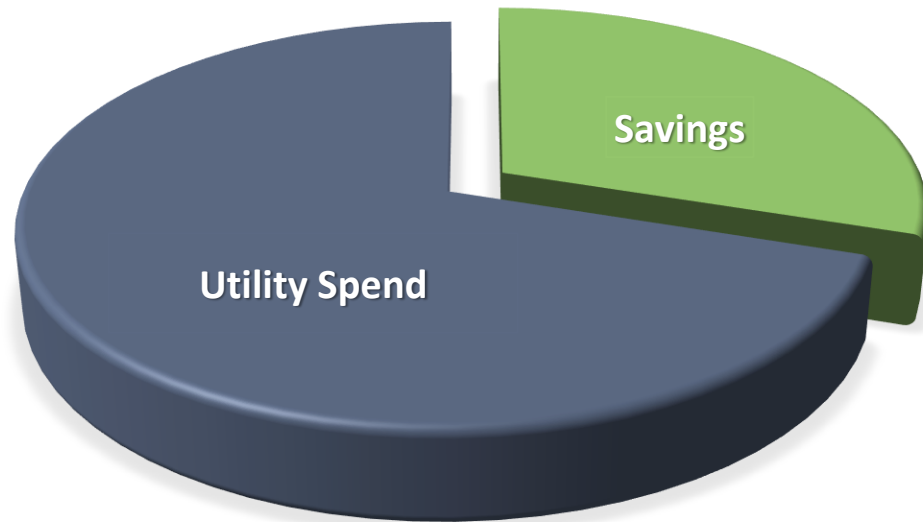


Design-Bid-Build

- Design process is costly, lengthy, inflexible
- Long project lead times
- Opaque & adversarial competitive bid process
- ***Driven by lowest initial cost, not best value***
- Collaboration between parties is difficult & prone to conflict
- Outcomes not performance based
- High degree of Owner involvement necessary
- ***Owner bears all the risk***



Energy Savings Performance Contracting (ESPC)



Example

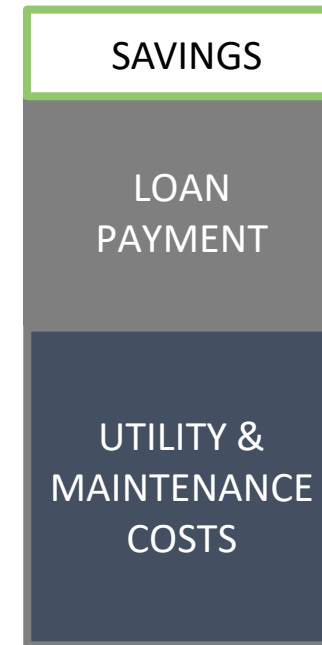
City/Client Utility Budget: ~\$400K

ESPC Potential savings: ~\$80K per year

ESPC Project Potential: ~\$1.2M



BEFORE
ESPC

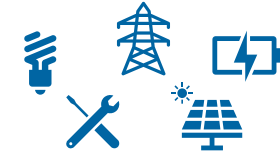


DURING
FINANCE
PERIOD



AFTER
ESPC

Energy as a Service (EaaS) – Spectrum



Some customers may only want a **narrow form of EaaS**

- Based on one technology with limited on-going Ameresco obligations (e.g., lighting aaS for C&I)

Some customers may want a more **comprehensive, all-encompassing EaaS**

- Fold in other services such as supply management, decarbonization, resiliency, active demand management etc.
- Provide total cost/performance management of their entire energy/carbon asset portfolio, usage, and supply



Other customers may be satisfied with a **simple long-term service agreement** that includes bundled financing and limited risk transfer

Some customers may require an EaaS structured to achieve **specific, technical accounting requirements** in order to achieve their balance sheet or credit goals

BMW Manufacturing

Palmetto Landfill, SC



Landfill Gas Drives BMW Plant – Methane gas drawn from Waste Management's Palmetto Landfill is providing the energy needs at BMW's manufacturing facility in Spartanburg, SC. To help offset BMW's energy demand, BMW maintains its own power station on site. The station is powered by four turbines fueled by reclaimed methane gas piped in from the nearby Palmetto Landfill.

Project Highlights

Solution Types:

Cogeneration Power Plant; Design Build Turbine Retrofit; Energy-as-a-Service (EaaS) Partnership; Landfill Gas to Energy; Power Purchase Agreement

Turbines Generate Electricity to Meet Approximately:

50% Plant's Total Energy Needs

Annual CO2 Emissions Reduction:

92,000 Tons

Landfill Gas Pipeline:

9.5 Miles

Annual Energy Savings:

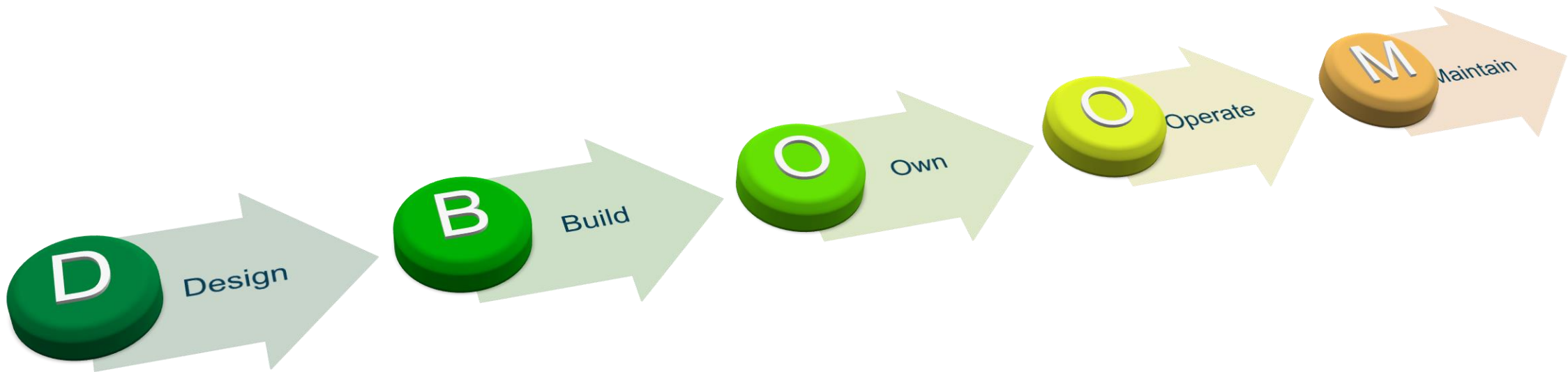
\$6,000,000

Capacity MWE:

14.9

Design-Build-Own-Operate-Maintain (DBOOMB)

- Combines responsibility for multiple functions under a single entity which makes it more efficient
- Produces a turnkey project that mitigates risk



City of Phoenix's 91st Avenue Wastewater Treatment Plant, AZ



Ameresco designed, built, owns, operates, and maintains (DBOOM) the largest wastewater treatment **biogas-to-renewable natural gas (RNG) facility** of its kind in the United States. The EaaS solution delivers a **credit positive energy infrastructure** solution to the wastewater treatment plant (WWTP) - owned by the sub-regional operating group (SROG) member cities: Phoenix, Glendale, Mesa, Scottsdale, and Tempe and is operated by the City of Phoenix.

Project Highlights

Solution Types:

Design, Build, Own, Operate & Maintain; Energy as a Service; Wastewater Biogas-to-RNG; *(Used as Vehicle Fuel under EPA's Renewable Fuel Standard Program)*

Facility Size:

~1 acre of land connected to an interstate pipeline via a 3-mile dedicated RNG pipeline

Capable of Processing Raw Biogas:

3,250 standard cubic feet per minute

Annual RNG Injection Into Commercial Pipeline:

693,500 DTH

Annual Carbon Emissions Reduction:

45,000 tons

Woodland Meadows Landfill, Michigan



- *Ameresco designed, built, owns, operates & maintains an RNG facility at the Woodland Meadows Recycling and Disposal Facility in Canton, MI in 2017*
- *The RNG facility operates on a continuous basis and converts about 6,600 standard cubic feet per minute of landfill gas to 3,500 dekatherms of RNG per day*
- *Partnership with GAIN Clean Fuel to deliver RNG through pipeline to transportation sector*

San Antonio Water System (SAWS)

Bexar County, TX



SAWS partnered with Ameresco under a PPA to create a biogas project that was the first sustainable project of its kind in the nation. This EaaS project restructured SAWS to utilize all elements from the processing of wastewater and support a positive environmental outcome. Over the 20-year term, the project will provide significant improvement to the environment around the SAWS Wastewater Treatment Plant through the major reduction of flared emissions at the site.

Project Highlights

Solution Types:

Biogas; Design, Build, Own, Operate & Maintain; Energy as a Service (EaaS); Power Purchase Agreement (PPA); Wastewater

Biogas Processed Daily:

1.5 million standard cubic feet

Natural Gas Delivered Daily:

900,000 cubic feet

Recycled Water Daily Community Use:

115 million gallons

Estimated Annual Royalties:

\$200,000

First Sustainable Project of Its Kind in the Nation

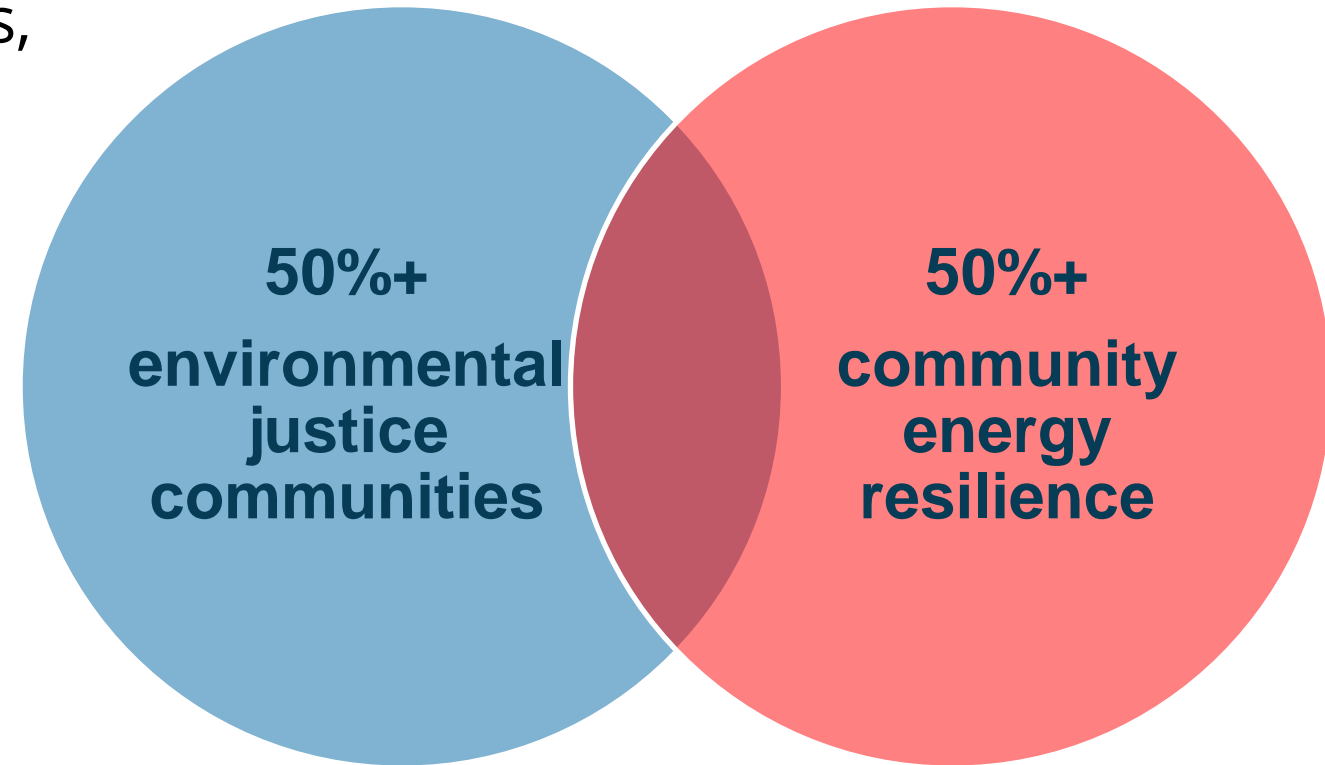


Grants



Oregon Department of Energy: Community Renewable Energy Program

- **Who:** Oregon Tribes, public bodies, and consumer-owned utilities.
- **What: \$12 Million** in grants for projects that support program equity goals, demonstrate community energy resilience, and include energy efficiency and demand response
- **When:** June 10th 2022!



ODOE: Community Renewable Energy Program **Eligible Projects**

- **Eligible projects** include **renewable energy generation systems** like **solar** or **wind**, and **energy storage systems, electric vehicle charging stations**, or **microgrid** technologies paired with new or existing renewable energy systems
- Eligible applicants are encouraged to partner with community groups, non-profits, private businesses, and others on potential projects

Grant Amounts

Project	Maximum Award	Maximum Percent of Eligible Project Costs
Planning a community renewable energy project	\$100,000	100%
Planning a community energy resilience project	\$100,000	100%
Constructing a community renewable energy project	\$1,000,000	50%
Constructing a community energy resilience project	\$1,000,000	100%

Due Date: June 10th 2022!



Making it Happen



Steps to Success

- Identify a High-Level RNG Champion within Organization
 - Liaison between multiple departments and functions
 - Hold the vision
- Determine Organizational Priorities & Financial Objectives around RNG
 - The pathway to RNG – technically, financially, strategically
- Partner with Experienced RNG Project Developer/Owner & Resources

Benefits of RNG

- Carbon Neutrality & Institutional Sustainability
- National Energy Independence & Security
- Revenue Generation for Site Owners
- Creation of Green-Collar Jobs
- Local Environmental Benefits



Thank you!

Kathleen Kelleher
Account Executive

kkelleher@ameresco.com
509-343-5355 (office)
775-385-3472 (mobile)

Ameresco – Pacific Northwest
222 S Williams Ste 102
Renton, WA

About Ameresco

Ameresco (NYSE:AMRC) is a leading energy services company with a comprehensive portfolio of energy efficiency and renewable energy solutions.

Founded in 2000 | Public in 2010



Comprehensive Portfolio

Objective approach and in-house technical expertise delivers the most advanced technologies to meet the unique needs of each customer. Majority of projects are budget-neutral, funded by energy cost savings.

Customer Driven

Federal & Municipal Governments, Commercial & Industrial, Higher Ed, K12, Public Housing, Healthcare, Airports. Market reputation across North America & Europe for excellence in customer satisfaction.



\$6 Billion+ in energy solution projects, 260 MWe of Owned Assets in Operation



8,000+ Customers benefitting from energy efficiency measures and renewable energy generation



1,000+ Employees throughout North America and the United Kingdom



Up to 45% Energy cost savings with comprehensive, audit-based improvements



70+ Offices providing local expertise in markets served



In 2019, our renewable energy assets and customer projects delivered a carbon offset equivalent to **11,167,978 metric tons of CO₂**

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