Implementing Climate Action Plans (CAPs), Modernizing Infrastructure

November 3, 2023

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Siemens Smart Infrastructure

Business to Society Programs

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Overview – Energy Savings Based Solutions

Cost Effectively Modernizing Infrastructure

Traditional Approaches, Industry Trends,
New Federal Funding Opportunity

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Energy Savings Based Solutions

Flexible Vehicle, Demonstrated History of Proven Results

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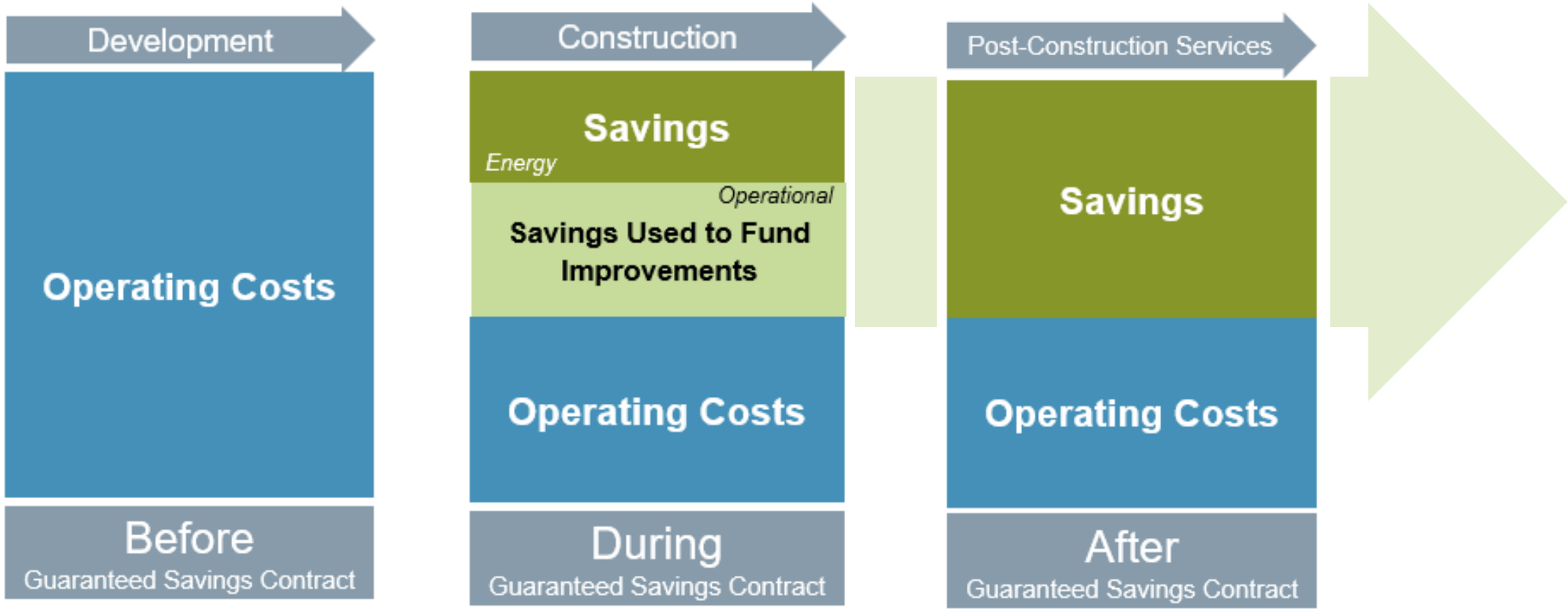
Utilizing the Value of Energy Savings Generated within Operating Budgets to Fund Project Development, Implementation, & Post-Construction Services



Note: This is an illustration only. The percent of savings varies from project to project

The Inflation Reduction Act *(August 16,2022)*

Enhancing Economics of CAP Implementation

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IRS: ITC or PTC Eligible Entity –
Owner of **Qualified Renewable Facility**

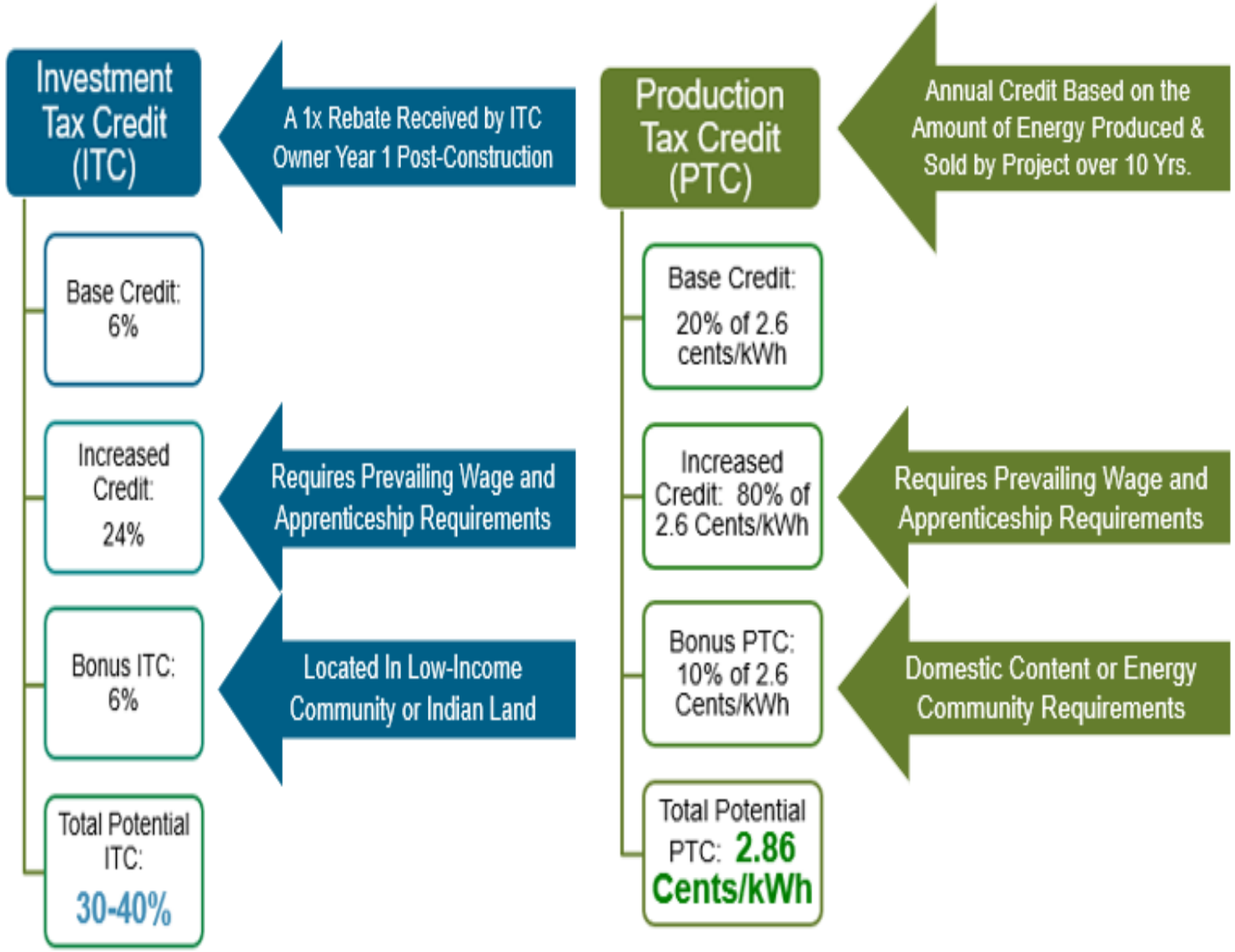
- Municipality or PPA Provider

IRA Qualifying Renewable Energy Technologies (ITC or PTC)

- Solar PV
- Wind
- Biomass
- Municipal Solid Waste (Landfill Gas & Trash)
- Geothermal
- Hydropower
- Marine & Hydrokinetic Energy
- Battery Energy Storage
- Biogas
- Microgrid Controllers
- Dynamic Glass
- Linear Generators.
- Interconnection Costs (<5MW)

January 1, 2025

Projects Enter Construction



PA Guaranteed Energy Savings Act (GESA) Programs

62 Pa. C.S. §§ 3751-3758, as Amended

Basis Towards Realizing CAP Objectives

Flexible Vehicle, Demonstrated History Delivering Proven Results

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PA Guaranteed Energy Savings Act (GESA) Programs

Flexible Contracting Vehicle, Demonstrated History of Proven Results

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Legal

- PA Legislation Enacted in 1998 (62 Pa. C.S. § 3751-3758, as amended)
- Leveraged by Hundreds of PA Institutions
- Finance Guaranteed Cost Savings Over 20 Year Repayment Term
- Savings Guaranteed by Qualified Energy Services Company (ESCO)
- Not Subject to "Low-Bid" Scope Selections
- Flexibility to Incorporate Public-Private Partnership (P3) Type Contract Structures (EaaS, PPA, DBOOM, MSA) as needed
- Public Request for Proposal (RFP) on ESCO Qualifications

Financial

- No Capital Dollar Outlay Required (Excluding Energy-Related Cost Savings)
- Projects Financially Supported by Savings Generated
- Consolidates Development, Construction, & Post-Construction Service Costs
- Does Not Impact Operating or Capital Budgets
- Investment Tax Credits (ITCs), Energy Rebates, Grants, and Incentive Programs
- Option to Include Capital $ Contributions to Address Larger CAP Capital Planning Objectives
- P3 Type Structure Options

Technical

- New Technologies Installed
- Modernized Infrastructure
- Comprehensive Project Scopes
- Iterative, Phased Scope Development Process
- No Cost / No Obligation Preliminary Energy Analysis to Determine Potential
- Streamlined Implementation of Critical Projects
- ESCO Partner Serves as "GC"
- No Change Orders
- Measurable Energy Savings and Offsets to Optimize Operational Sustainability
- Enhanced Sustainability, Resiliency
- Documented GhG Reductions

- Funds New Infrastructure
- Addresses Deferred Maintenance Issues
- Creates Jobs
- Positive Impact to Local Economy
- Applies 25+ Years Industry "Best Practices & Process
- Documents & Tracks Results Over Performance Term
- Realizes CAP Objectives in Short-Term

PA Guaranteed Energy Savings Act (GESA) Programs

Flexible Contracting Vehicle, Demonstrated History of Proven Results

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Energy Conservation Measures (ECMs)	New, Efficient Lighting and Lighting Control Systems (Internal, External, Street)
	Energy Management Control Systems, Digitization, Integrations, Retro-Commissioning
	New Boiler Plant Upgrades, Replacements
Facility Improvement Measures (FIMs)	New Cooling System, Chiller Upgrades
	New Energy Efficient HVAC Equipment and Systems
	Weatherization Improvements…New Roofs, Windows, Infiltration Reductions
Deferred Maintenance Projects	Water Conservation, Wastewater Infrastructure Rehabilitation
	Renewable Energy Technologies --- Solar PV, BESS, Hybrid, Geothermal, Wind, Etc.
	Optimized Utility Service Contract Arrangements
Energy Related Cost Savings Projects	Demand Response Revenues ($)
	EV Infrastructure
	Other customized solutions needed by the Municipality

PA Guaranteed Energy Savings Act (GESA) Programs

Flexible Contracting Vehicle, Demonstrated History of Proven Results

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pennsylvania
DEPARTMENT OF GENERAL SERVICES

Guaranteed Energy Savings Act (GESA) Program

16
GESA Solutions Implemented

$219.7M
Total Project Investment

$16.9M
Minimum Annual

"Energy Related Costs Savings"

PA DGS GESA Program Projects Through August 2022

FEMP
Federal Energy Management Program

U.S. DoE / Energy Savings Performance Contract (ESPC) Program

438
ESPC Implemented Since 1998

$7.8B
Total Project Investment

$17.7B
Minimum Annual Savings

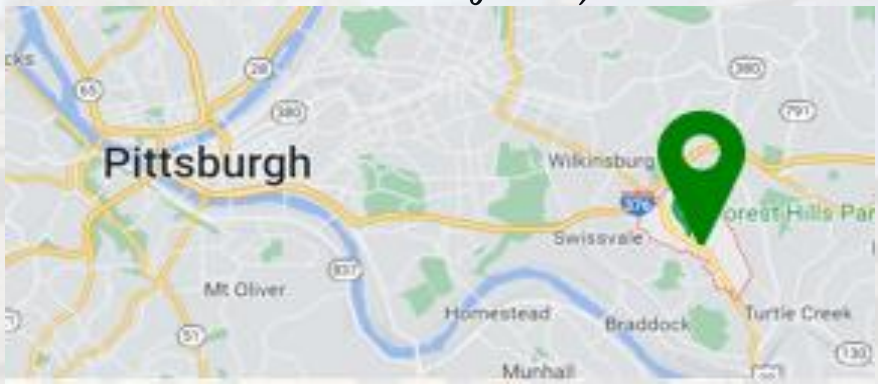
U.S. DOE FEMP ESPC Program Stats: 1997-2020

Example – Borough of Forest Hills, PA

Utilizing PA GESA to Implement Climate Action Plan (CAP)

2023 - In Construction

- Climate Action Plan Adopted Dec. 16, 2020
- Preliminary Energy Audit – Oct 8, 2021
- Public Procurement – **GESA RFP/Q**
  - Issued: Feb 14, 2022
  - Selected: March 23, 2022
- Development/Investment Grade Audit (IGA) – June 20, 2023
- GESA Contract: May 4, 2023



Forest Hills Net Zero Borough Building (2017)
175kW Solar PV & Geothermal
150 Tons Annual CO2 Emission Reductions

Comprehensive GESA Scope

Efficiency, Capital Renovation, Deferred Maintenance, CAP Projects

- Lighting Upgrades
- Lighting Controls
- Envelope Improvements
- HE Pool Heater Replacement
- Air to Air Heat Pump 2nd Floor
- Site Controls / Integration,
- Roof Replacement
- Solar PV & Solar PV Canopy
- Functional Survey
- Refrigerant Catalyst
- HE Unit Heater Replacement
- Heat Pump Replacement
- Fire Office HP Replacement
- Refrigerant Catalyst RTU #1
- Virtual Net Metering
- Renovation RTU#1

2020 CAP Objective

Achieve Net Zero Carbon Emissions by 2050

2024 GESA Realized

89% CO2 Emission Reductions

100% Virtually Net Metered Operations.

PA Guaranteed Energy Savings Act (GESA) Programs

Flexible Contracting Vehicle, Demonstrated History of Proven Results

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Tracking Emission Reductions, Savings, Local Impacts

Resulting Greenhouse Gas (GhG) Emission Reductions Projected Annual Avoided Emission (CO^2) Production				
Utility & Reductions Over Time	Annual GhG Emission Reductions (Lbs.)	Pounds of Coal Not Burned	Gallons of Gasoline Not Consumed	Barrels of Oil Not Consumed
Electric	405,270	256,707	25,787	530
Natural Gas	99,966			
Totals (Annual):	505,236	256,707	25,787	530
Totals (20 Years):	10,104,720	5,134,140	515,740	10,600

Energy Public-Private Partnership (P3) Structures

GESA Related

Realizing CAP, Capital Improvement & Deferred Maintenance Implementation

Modernizing Energy Infrastructure, Enhancing Financials, Mitigating Risk & Long-Term Liabilities

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Energy Public-Private Partnership (P3) Structures

Trends & Drivers – Industry Overview

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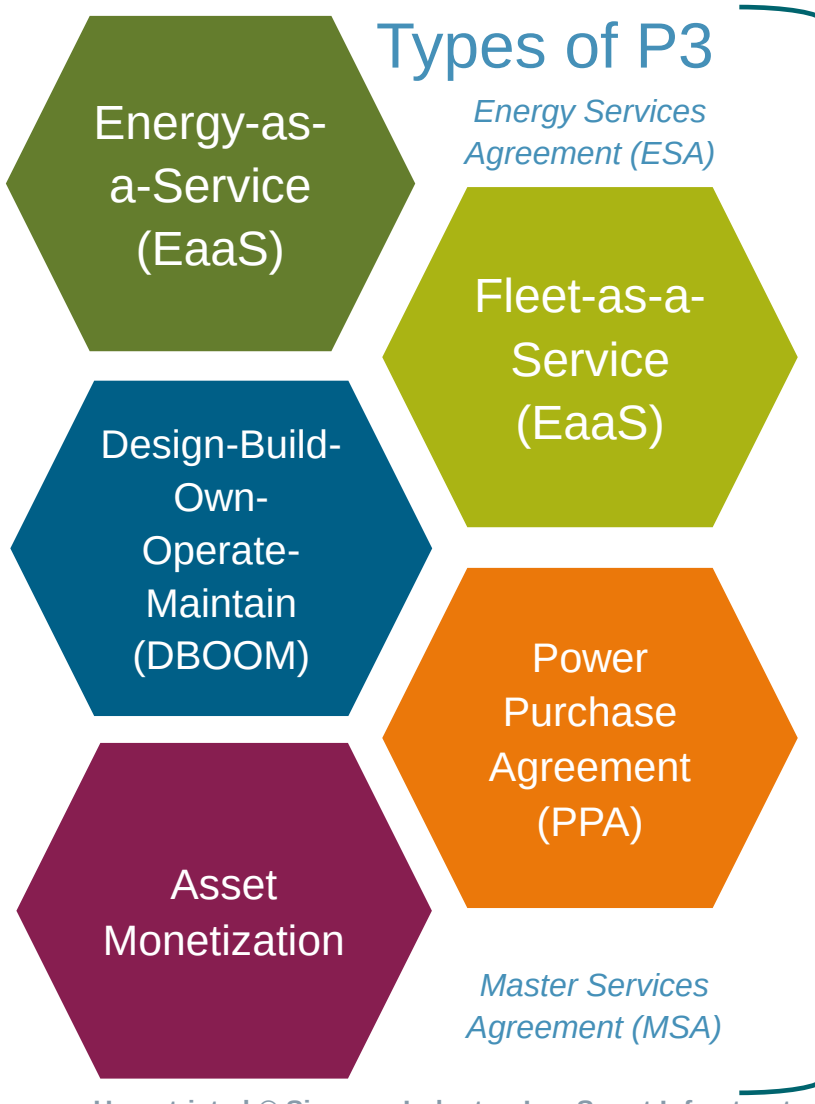

- Alternate Means to Fund Capital Upgrades
  - No Capital Outlay Needed
  - Averts Need to Raise Taxes
  - Address Mounting Deferred Maintenance Projects
  - Modernization, Efficiency, Sustainability, Resiliency, Workforce/Education Objectives
- Integrates Project Development, Construction & Post-Construction Services
- Determines Feasibility (Technical & Financial) of Various Technologies and Upgrades
- **Major Differences –** Scope/Technologies, Finance (Source & Structure) and Term

Energy Public-Private Partnerships (P3)

GESA Related Structures, Optimizing CAP Financials, Long-Term Performance

Pathway to Decarbonization, Electrification, Sustainability

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P3 Provider:

- Funds Projects that Modernize Thermal & Energy Systems…Not the Municipality
  - Mitigates Impact that Capital Projects have on the Municipality's Credit Ratings & Worthiness
- Transaction Modeled to be Credit Neutral – Positive
  - Utilizing Concession Type Agreements
- Captures Tax Benefits (30-40%+) & New Grant Funding on Clean Energy Investments
- Payments Typically Modeled as a Utility Bill
  - Impacts Municipality's Financials Similarly to Other Utility Costs…Electric, Gas, Water, Etc…

PA Municipality:

- New, Cleaner, Energy Infrastructure
  - More Sustainable Operation Over Long-Term
- Commits to be Primary Off-Taker of Utilities
- No CapEx Expenditure – Conserving Capital Funds
  - Municipality Debt Service Capacity Preserved
- Guaranteed Savings Used to Offset Payments to P3 Provider
- Traditional Performance Liability & Operational Risk Eliminated

Determining Savings Potential, Recommendation

Next Steps

Procurement, Project Development, Contracting, Construction

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Recommended Structure

Optimizing CAP Financials, Long-Term Performance

Pathway to Decarbonization, Electrification, and Long-Term Sustainability

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PA Guaranteed Energy Savings Act (GESA)

PA GESA

"Energy Related Cost Savings"
Leveraging Guaranteed Cost Savings & Capital Funds to Buy-Down & Address Borough Priorities

Potential Public Private Partnership (P3) Type Agreements

- Energy-as-a-Service (EaaS) - Energy Services Agreement (ESA) -
- Design-Build-Own-Operate-Maintain (DBOOM)
- Power Purchase Agreement (PPA)
- Master Services Agreement (MSA)

Clean, Renewable Energy Technologies, Distributed Systems

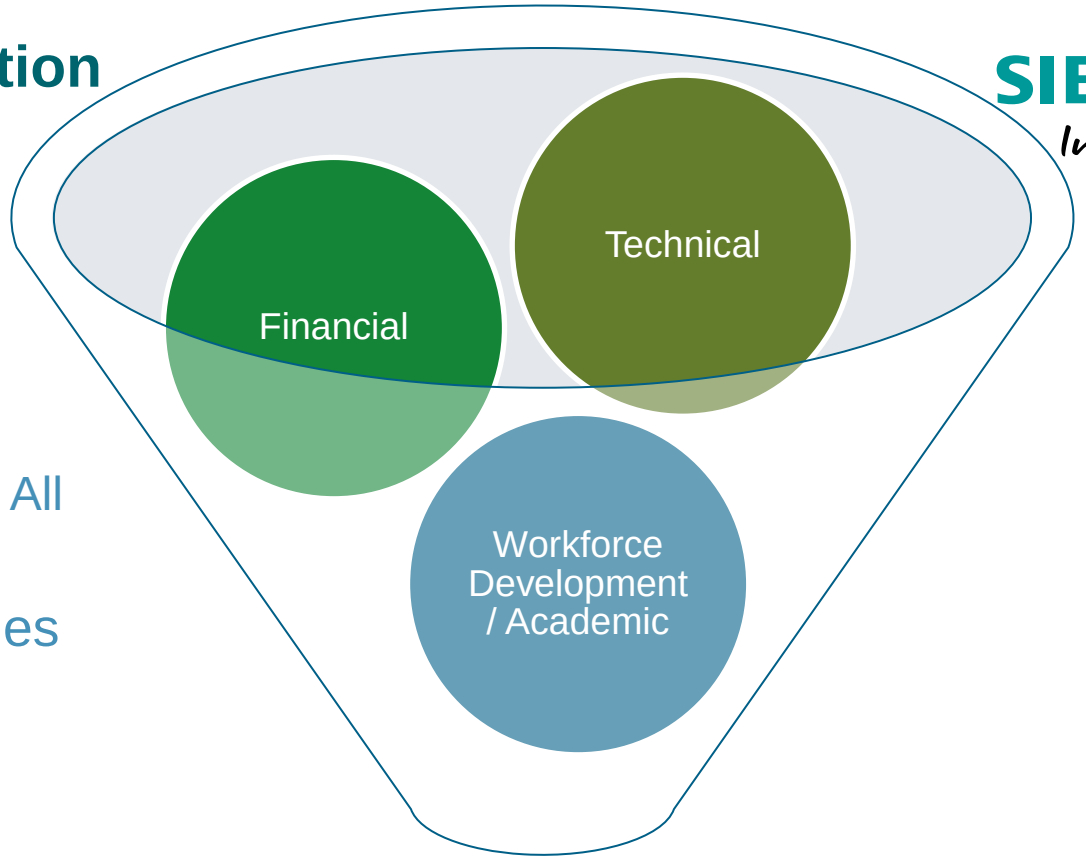
- Solar PV
  Solar Thermal
  Battery Energy Storage (BESS)
  Electrification
- Geothermal
  Wind, Biomass
  Cogeneration
  Fuel Conversion
- STEM
  Workforce Programs
  Local Academic Integration
- EV Charging Infrastructure
  Sustainability Manager / CEMs
- Digitization & Smart-City Technologies
  Micro-Grid / Smart-Grid Solutions

Next Steps – Feasibility & Evaluation

Step 1 – Assess Potential

Step 1 – Conduct "Preliminary Assessment"

- Data Collection, Survey
  - Utility Histories, Operational Data, All Facilities
- Pilot Project – A Selection of Facilities
- Identify Goals with Stakeholders:
  - Technical
  - Financial
  - Workforce Development /Academic
- Identify Range of Contract Options
  - GESA
  - EaaS
  - PPA
  - DBOOM
  - Monetization
  - Combination



Go / No Go

- Public Procurement – GESA RFP/Q
  - Select CAP Implementation Partner

Next Steps – GESA RFPQ Procurement

Detailed Studies, Scope Development, Contract, Build

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1. **Select GESA/CAP Implementation Partner**
2. Define Objectives, Priorities for Borough– Modernization, Sustainability, Carbon Reduction, Resiliency, Asset Monetization, Revenue Creation, Liability Mitigation, STEM Workforce, Etc…
3. Finance Options & Contract Structures – Discuss "Best Fit" Application
   - Define Contract Term (20, 30, 40+ Years), On/Off Balance Sheet
4. Conduct Detailed Utility & Financial Analysis – 36-Months Preferred
   - Utility Bills – Electricity, Natural Gas, Fuel Oil, Propane, Water, Sewer, Etc…
5. Drawings (All Facilities)
   - Square Footages/Bldg, General Floor Plans
   - Mechanical, Electrical, Plumbing (MEP) and HVAC Systems
6. Borough / Campus-Wide Site Surveys
   - Develop Scope Concept along with Potential Funding Options
7. Contracting → Project Financing, Design, Construction, Operations
   - Development Costs Rolled-Forward into Final ESA/Contract or billed upon last end-of-service

Thank You

Questions?

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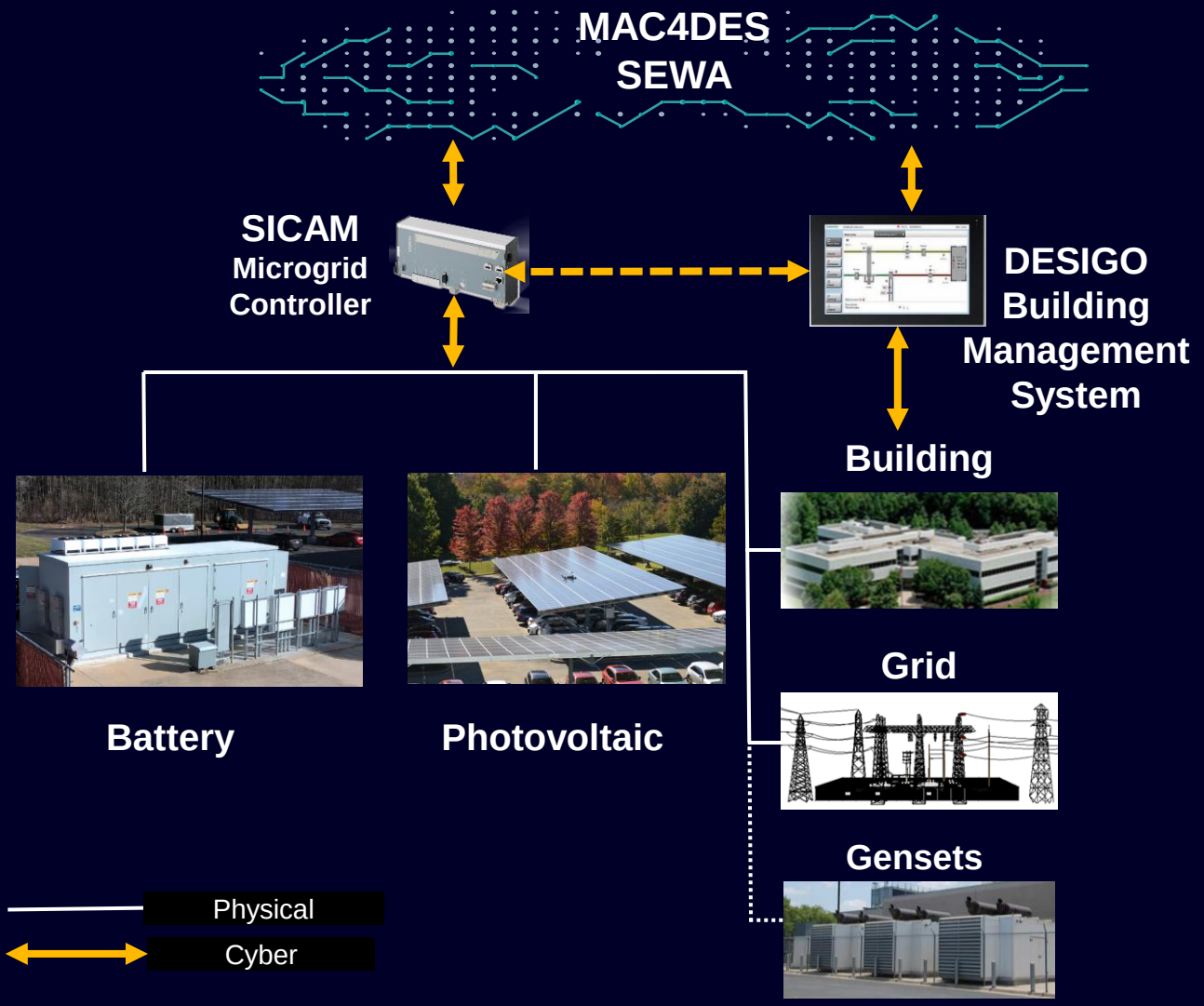
Princeton Island Grid

A living lab to drive innovation and sustainability



Virtual Tour

Components

- **Siemens Building Management System DESIGO CC**
- **Siemens Microgrid Controller (MGC)**
- **Siemens Battery Storage System:** 1MWh/500kW
- **Photovoltaic System:** 836 kWp
- **Siemens VersiCharger for electric vehicles**: 6x7.2kW

Research Focus

- **Optimal Microgrid and Building Operation**
- **Internet of Things**
- **Performance Monitoring and Analytics**
- **Simulation and Digital Twins**
- **Cyber Security**

MAC4DES: Mindsphere Application Center for Distributed Energy Systems
SEWA: Siemens Energy Workplace for Analysts

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Blue Lake Rancheria, Campus, USA

Microgrid

Renewable Generation Sources:

- 175 kW Fuel cell + biomass
- 500 kW Solar PV & 500 kW/1000 kWh Battery

$ 200K
energy savings per year

0.00
zero net energy in island mode

200 t
CO_2 savings per year

Solution

- Spectrum PowerrTM Microgrid Management System
- 700 kW Load includes Casino, Hotel, Tribal Offices
- 1 MW Diesel generator for base generation
- Economic dispatch of solar/battery system
- Siemens PTI Electrical System Stability and Grid Impact Study

"When public safety power shutoffs left the surrounding community in darkness, Blue Lake Rancheria's systems were up and running."

"When you control your energy, you control your future."

***Jana Ganion** – Sustainability and Government Affairs Director, Blue Lake Rancheria*

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Javits Center

Video Case Study

Responsible Partner: Calibrant Energy

Vertical: C&I

Location: NY

Technology: Solar

Project Scope: 1.62 megawatts of solar, 3.5 megawatts of battery storage

Calibrant Energy will help New York City's largest rooftop solar generation project to date will offset the building's electric load and directly support current agenda for 100 percent carbon-free electricity in New York by 2040 and a ramp up for 70 percent of electricity to come from renewable energy by 2030.

- 1.62 megawatts of solar, 3.5 megawatts of battery storage and advanced controls: an addition that will allow excess generation from Manhattan’s largest rooftop solar array to be stored for use during times of peak power demand, reducing energy costs and helping New York meet its aggressive solar and energy storage targets.
- More than 4,000 solar panels will be constructed over the HVAC units on the Javits Center’s green roof so as not to impact plants on the building's rooftop.
- The roof is also a wildlife sanctuary for 26 bird species, five bat species and thousands of honeybees, according to the Javits Center. The planned rooftop solar panels will be built on top of existing HVAC units, to avoid disturbing the roof’s greenery
- The project is estimated to offset more than 1.3 million pounds of carbon emissions each year, which is equivalent to removing 262 cars from the road.

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PA Guaranteed Energy Savings Act (GESA) Programs

Flexible Contracting Vehicle, Demonstrated History of Proven Results

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Example:

GESA & Energy Savings Program Modeling

Incorporates Available Rebate & Grant Funding *(Fed, State, Utility)*

Year	Energy Savings	Operational Savings	Gross Savings	Principal & Interest	Ongoing Support	Program Costs	Annual Contribution	Annual Net Cashflow	Cumulative Net Cashflow
Constr	$32,964	$0	$32,964	$0	$0	$0	$0	$32,964	$32,964
1	$99,890	$15,029	$114,918	$331,285	$21,527	$352,812	$237,894		$32,964
2	$101,388	$15,254	$116,642	$331,285	$22,173	$353,458	$236,816		
3	$102,909	$15,483	$118,392	$331,285	$22,838	$354,123	$235,732		
4	$104,452	$15,715	$120,168	$331,285	$23,523	$354,809	$234,641		
5	$106,019	$15,951	$121,970	$331,285	$24,229	$355,514	$233,544		
6	$107,609	$16,190	$123,800	$331,285	$24,956	$356,241	$232,441		
7	$109,224	$16,433	$125,657	$331,285	$25,704	$356,990	$231,333		
8	$110,862	$16,680	$127,542	$331,285	$26,476	$357,761	$230,219		
9	$112,525	$16,930	$129,455	$331,285	$27,270	$358,555	$229,100		
10	$114,213	$17,184	$131,397	$331,285	$28,088	$359,373	$227,977		
11	$115,926	$714	$116,640	$331,285	$28,931	$360,216	$243,576		
12	$117,665	$724	$118,389	$331,285	$29,799	$361,084	$242,695		
13	$119,430	$736	$120,166	$331,285	$30,692	$361,978	$241,812		
14	$121,221	$746	$121,968	$331,285	$31,613	$362,899	$240,931		
15	$123,040	$758	$123,797	$331,285	$32,562	$363,847	$240,049		
16	$124,885	$769	$125,654	$331,285	$33,538	$364,824	$239,170		
17	$126,758	$780	$127,539	$331,285	$34,545	$365,830	$238,291		
18	$128,660	$792	$129,452	$331,285	$35,581	$366,866	$237,414		
19	$130,590	$804	$131,394	$331,285	$36,648	$367,934	$236,540		
20	$132,549	$817	$133,365	$331,285	$37,748	$369,033	$235,668	$0	$32,964
Total	**$2,342,778**	**$168,489**	**$2,511,267**	**$6,625,706**	**$578,441**	**$7,204,146**	**$4,725,843**	**$32,964**	**$692,235**

"Energy Related Costs Savings"

Capital $ Contribution

- *A cost saving resulting from the implementation of an ECM.*
- *Avoided current or planned capital expense.*
- *Avoided renovation, renewal or repair costs as a result of replacing old and unreliable equipment and systems or thermal improvements to the building envelope*

Energy Public-Private Partnerships (P3)

GESA Related Structures, Optimizing CAP Financials, Long-Term Performance

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Traditional Contracting Methods Vs GESA & P3 *(Typical)*	Traditional Design-Build Contracting	PA GESA Energy Performance Contacting (EPC)		Energy/Fleet-as-a-Service (E/FaaS)	Power Purchase Agreement (PPA)	Design-Build-Own-Operate-Maintain (DBOOM)
		1) GESA Hybrid	2) Self-Funded			
Institution Secured Debt Financing	Yes			No		
Capital Investment / Outlay Required	Yes	Combination of City Capital & Financed Savings	No	No		
Balance Sheet Impact	Debt Financing / Credit Rating Impact			"On" or "Off" / Positive to Neutral		
Integrated "Turnkey" Services & Costing – *Development & Construction*	No	Yes		Yes		
Savings & Performance Guarantees	No	Yes		Yes	Performance Guarantee	Yes
Asset Monetization Potential	No			Yes		
Contract Term (Typical)	Construction Term	15 – 20 Years		20 – 30+ Years	20-25 Years	20-30+ Years
Payments	Due as Contracted	Debt Service Over Term		Modeled as Utility Bill	Modeled as Utility Bill	Modeled as Utility or Service Bill