



FY2021

State Energy Report



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Table of Contents

Acronyms	3
Introduction	4
Methodology.....	4
Policy Impacts	5
Energy in FY 2021.....	6
A Closer Look by Commodity	6
State Portfolio	9
Top 5 Agencies	9
Energy Cost and Consumption by State Agency	11
Forward Planning	12

List of Figures and Tables

Figure 1 Total Energy Consumption and Spend from FY17 through FY21.....	6
Figure 2 FY21 Ratio of Total State Energy Expenditures [US\$] and Consumption [MMBTU] by Commodity	7
Table 1 Annual Cost of Each Commodity FY19 – FY21	8
Figure 3 Percentage of Properties Per Agency	9
Table 2 Top 5 Agencies based on the number of properties, buildings, and square footage	10
Table 3 Energy Cost and Consumption by Agency (FY21)	11
Figure 4 Energy Consumption by Agency (FY 2019 to FY 2021)	11

Acronyms

BPU	New Jersey Board of Public Utilities
CEA	Clean Energy Act of 2018
DPMC	Treasury Department, Division of Property Management & Construction
ECC	New Jersey Energy Capital Commission
ECM	Energy Conservation Measure
EMP	Energy Master Plan
ETS	Energy Tracking System
FY21	NJ State Fiscal Year 2021 (July 2020-June 2021)
kWh	Kilowatt hour measurement for electricity
LBAM	State of New Jersey Location Building Asset Management System
LGEA	<i>New Jersey's Clean Energy Program</i> Local Government Energy Audit
MCF	One Thousand Cubic Feet measurement of natural gas
MMBTU	One Million British Thermal Units measurement of natural gas
PM	U.S. Environmental Protection Agency's Energy Star Portfolio Manager
SES	New Jersey Board of Public Utilities, Division of State Energy Services

The New Jersey Board of Public Utilities (BPU), Division of State Energy Services (SES) is responsible for this report, which was developed during the fall of 2021 using data available at the time. SES, which includes the State Energy Office, manages the State's Energy Savings Improvement Program (ESIP), guides and directs energy solutions for State departments and agencies, and offers technical support for any and all State agencies and facilities on energy efficiency (EE) and operational matters, including but not limited to on-site generation, upgrades and efficiency systems. The SES procures State electric and gas wholesale contracts and manages those contracts. The SES also works in conjunction with the State Energy Capital Committee to identify, evaluate and select energy conservation project opportunities at State facilities, and assists with Request for Proposal development and selection of vendors and funding.

Introduction

Under Governor Murphy, the State of New Jersey has made great strides advancing energy policy. As a large consumer of energy, State government is accountable to taxpayers for demonstrating the strategic energy management and reporting on State spending. Within the Board of Public Utilities (BPU), the Division of State Energy Services (SES) serves as a resource for State agencies to manage energy costs and improve State facilities. The State uses several energy mitigation tactics to manage this spend. Through policy actions such as the signing of the Clean Energy Act (CEA) in 2018, laying out a vision in the 2019 Energy Master Plan (EMP) and setting goals for electric vehicle (EV) adoption by 2025, New Jersey government is setting the stage to lead by example. These policies are being implemented as the State also grapples with an ongoing pandemic, which has impacted the way government operates and delivers services.

This report serves to highlight policy impacts to the State portfolio, energy cost mitigation to save taxpayer dollars, and energy consumption patterns of State facilities for Fiscal Year 2021 (FY21).

Methodology

This report utilizes several State database repositories to gather up-to-date accurate information. A list of the State-owned buildings with data attributes, including square footage, were accumulated from the State's Land Building Asset Management (LBAM) system. LBAM is the official repository of the State's capital assets and contains records of all state owned and leased buildings. The current and historical energy data was aggregated from the State's Energy Tracking System (ETS), which houses energy data for executive branch state buildings and helps track energy use for New Jersey State government buildings. Energy bills from Fiscal Year 2017 (FY17) through FY 2021 (FY21), or July 2016 through June 2021, were analyzed for inclusion in the report. Data cleansing was performed to remove inaccurate, incorrect, or corrupt data. Staff was then able to determine energy cost and consumption calculations by portfolio, agency, facility and commodity. The data was further converted to a common unit of MMBTU's from site-based energy for an overall comparison of commodities.

Square footage data was acquired in FY21 to begin the process of benchmarking building performance in future reports (i.e., dollars/square foot). This data will be used to determine future energy consumption per square foot comparisons as well as setting other metrics to measure performance against. Together with the Energy Star Portfolio Manager (PM), the goal is to create a more complete picture of energy efficiency in State facilities.

While the CEA requires buildings to begin benchmarking data through PM in calendar year 2022, FY 2019 (FY19) was utilized as the baseline energy consumption year for the purposes of this report because it is prior to COVID-19 and SES Staff (Staff) believes it is the most representative recent year to establish standard consumption pre-pandemic.

Policy Impacts

New Jersey has seen several changes in energy policy that are shaping how the State consumes power. The CEA required an energy reduction of 2% for electric and 0.75% for natural gas, to be achieved by 2023. Compared to baseline year (FY19), State government reduced electricity by 17% and natural gas by 29%. The CEA also established a benchmarking standard that, by May 2023, all commercial buildings above 25,000 square feet, including State-owned buildings, must benchmark energy and water data for 2022. To comply with the CEA, State agencies are currently working on creating PM accounts for State facilities and uploading data starting in January 2022, ahead of the requirement. The State is projected to meet or exceed the energy reduction and benchmarking requirements.

New Jersey’s EMP calls for an improvement in EE across all sectors, the retrofiting of State buildings, establishment of energy baselines, and audits of State facilities. The EMP assumes the implementation of Treasury Circular 10-04 OES/OMB, which requires agency energy managers to help manage consumption on the department level. In addition, energy audits for State buildings are being leveraged through the BPU Local Government Energy Audit (LGEA) program, which provides a preliminary assessment of buildings to help plan for future upgrades and retrofits. The main headquarters for both the Department of Community Affairs and Labor & Workforce Development had an LGEA performed in FY21.

Furthermore, electrification of the transportation fleet will help to achieve overarching policy goals, but will also have future impacts on the State’s consumption patterns. Agencies are currently planning for EV adoption and charging infrastructure. Accounting for this increase in demand in the overall portfolio will be important and can potentially be offset with renewable generation.

ENERGY EFFICIENCY SUCCESS STORIES

Marie Katzenbach School for the Deaf

This is a campus-type environment. The heat and hot water was delivered via a central utility plant and it had a failing steam distribution system. An ESIP project was initiated and installed as a comprehensive solution to the 24-building campus. The new ECMs total over \$800,000 in cost savings in addition to saving 320,000 gallons of fuel oil, 130,000 therms of natural gas, and 526,000 kWh of electricity annually. Many ECMs, from lighting to HVAC installation, were completed, however, the boiler decentralization was the most impactful ECM because of the conversion from oil to natural gas.

State Policy	State Policy Impacts to Consumption	Deadline State
CEA	<ul style="list-style-type: none"> Benchmarking of 25k sq ft buildings Energy Efficiency Reductions 	2023
EV	<ul style="list-style-type: none"> State Fleet Electrification 	2025; 2035
EMP	<ul style="list-style-type: none"> Building Energy Audits Build Energy Efficient Buildings Energy managers 	On-going

Energy in FY 2021

In FY21, the State spent just under \$95 million on energy and consumed approximately 4.37 million MMBTUs. In comparison, the State spent \$100.6 million and consumed 5.68 million MMBTUs during the baseline year. For the second consecutive year, the State reduced both energy cost and consumption over the previous year and over baseline year FY19. The downward trend in the State's energy costs and consumption can be seen in Figure 1, which illustrates the State's total energy consumption and spend from FY17 through FY21.

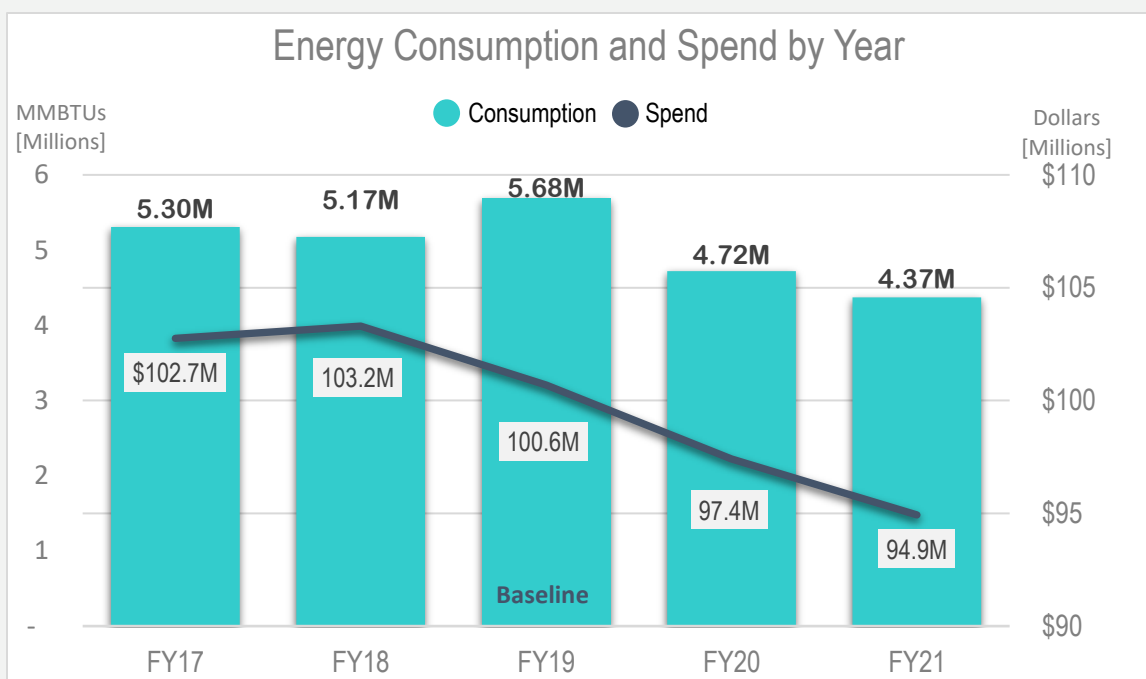


Figure 1 Total Energy Consumption and Spend from FY17 through FY21

The State saved \$5.8 million compared to baseline in energy costs compared and \$2.5 million compared to previous year. This translates to more than 6% and 2.6% reduction in energy costs compared to baseline and to the prior year, respectively. Similarly, the energy consumed decreased more than 23% this year compared to baseline, and nearly 7.4% compared to last year.

The State purchases energy through third party suppliers as a mitigation strategy to manage costs at State facilities. This aggregation pool covers over 7,000 electric and gas accounts. Through the collective buying power, the State saved approximately \$3,155,600 on electric and \$900,000 on natural gas this year. Cumulatively, the aggregation pool saved the State more than \$4 million in FY21.

A Closer Look by Commodity

Electric charges account for 63% of the State's annual energy expenses, but only 38% of the energy consumption. In contrast, natural gas makes up 18% of energy costs, but 45% of the

energy consumption. Hot and chilled water are the next costliest and consumed commodities after natural gas with expenses that account for 15% of the State’s annual expenses. Spending on these four (4) commodities makes up 96% of the State’s FY energy spend and 94% of the energy consumption. The State’s total energy spend and consumption are broken out by each commodity in Figure 2.

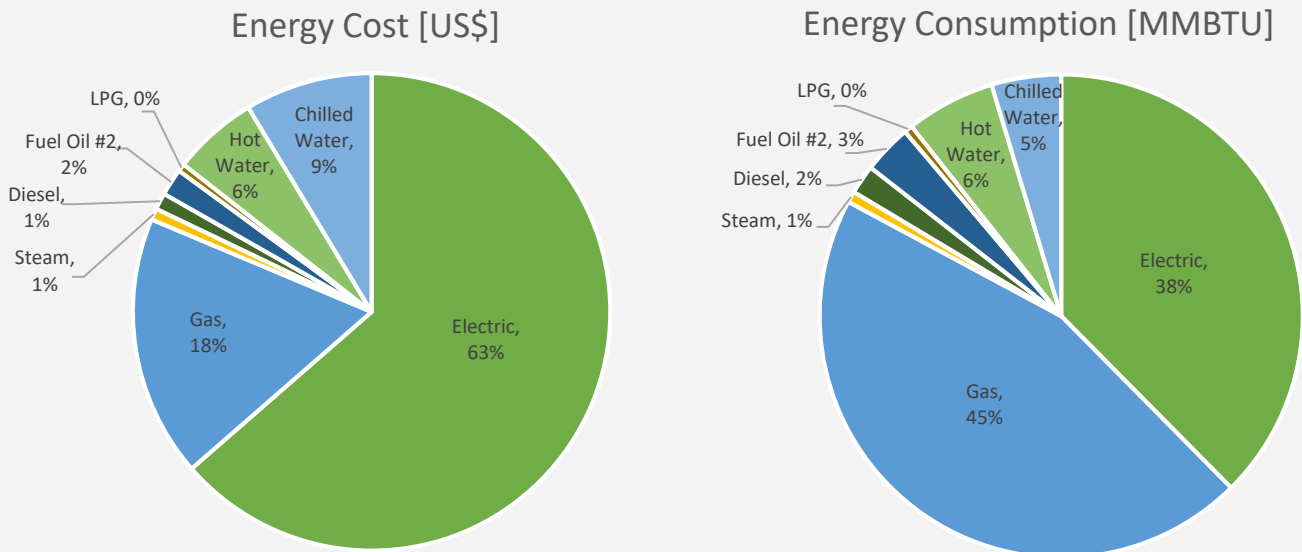


Figure 2 FY21 Ratio of Total State Energy Expenditures [US\$] and Consumption [MMBTU] by Commodity

The State experienced an overall cost and consumption decrease across all commodities compared to the baseline. Commodities include electric, natural gas, steam, hot and chilled water, diesel, fuel oil #2, oil, and liquefied petroleum gas (propane). All commodities have been included as the criteria that make up the annual energy cost and consumption analysis in this report.

It should be noted that while telework policies implemented by the State starting in March 2020 through October 2021, may have resulted in a partial savings, there were many facilities that kept normal operations during this time. The State may see an increase in energy use as State buildings are repopulated to pre-pandemic levels or an indoor air quality policy is adopted to install ionizers and/or change environmental controls.

There were several conversions from one commodity to another that took place through the Energy Savings Improvement Program (ESIP) or by straight steam-to-natural-gas or oil-to-natural-gas conversions undertaken at State facilities.

The State utilized some steam from a Combined Heat and Power/Boiler Plant in prior years, but one area where reductions in consumption occurred was at the Hunterdon Development Center and Edna Mahan Correctional Facility. Recently implemented energy conservation measures (ECMs) to decentralize the heating and steam systems resulted in drastic energy savings in FY21.

The current energy performance contract projects (also known as ESIP) are expected to save more than \$3 million in energy costs annually.

In FY21, the total electric spend was \$60,368,000 – the lowest of all five (5) years reviewed and lower than the baseline year by more than \$350,000. As compared to FY19’s baseline, all commodities (except where emergency generation equipment was rented) have decreased in total spend. Although diesel makes up less than 2% of the energy cost or consumption, the State experienced a noticeable increase in diesel consumption compared to the baseline. Electricity saw a 17% decrease in kWh and natural gas noticed a 29% drop in MMBTUs. Steam dropped significantly as expected, by more than \$2.4 million, or 23% compared to baseline. The following table shows annual spend and consumption per commodity from FY19 through FY21.

Commodity	Cost [\$]			Consumption [MMBTU]		
	FY2019	FY2020	FY2021	FY2019	FY2020	FY2021
Electricity	\$ 60,586,000	\$ 60,730,000	\$ 60,368,000	1,987,000	1,846,000	1,643,000
Natural Gas	\$ 17,850,000	\$ 16,576,000	\$ 16,835,000	2,790,000	1,968,000	1,978,000
Steam	\$ 3,182,000	\$ 2,682,000	\$ 741,000	135,000	138,000	33,000
Diesel	\$ 252,000	\$ 778,000	\$ 1,065,000	16,000	72,000	85,000
Fuel Oil #2	\$ 3,639,000	\$ 2,926,000	\$ 1,742,000	248,000	222,000	143,000
LPG	\$ 751,000	\$ 568,000	\$ 499,000	40,000	35,000	25,000
Hot Water	\$ 5,514,000	\$ 5,051,000	\$ 5,481,000	256,000	253,000	261,000
Chilled Water	\$ 8,914,000	\$ 8,102,000	\$ 8,197,000	216,000	187,000	203,000
Total	\$ 100,688,000	\$ 97,413,000	\$ 94,928,000	5,688,000	4,721,000	4,371,000

Table 1 Annual Cost of Each Commodity FY19 – FY21

State Portfolio

The State of New Jersey has a diverse real estate portfolio mix of more than 30 million square feet of properties. With buildings spanning from the 1600s to newly built buildings in 2021, the State owns 450 properties across 19 agencies and departments. Figure 3 illustrates the percentage of total properties per agency. In aggregate, the State’s portfolio contains 3,700 buildings.

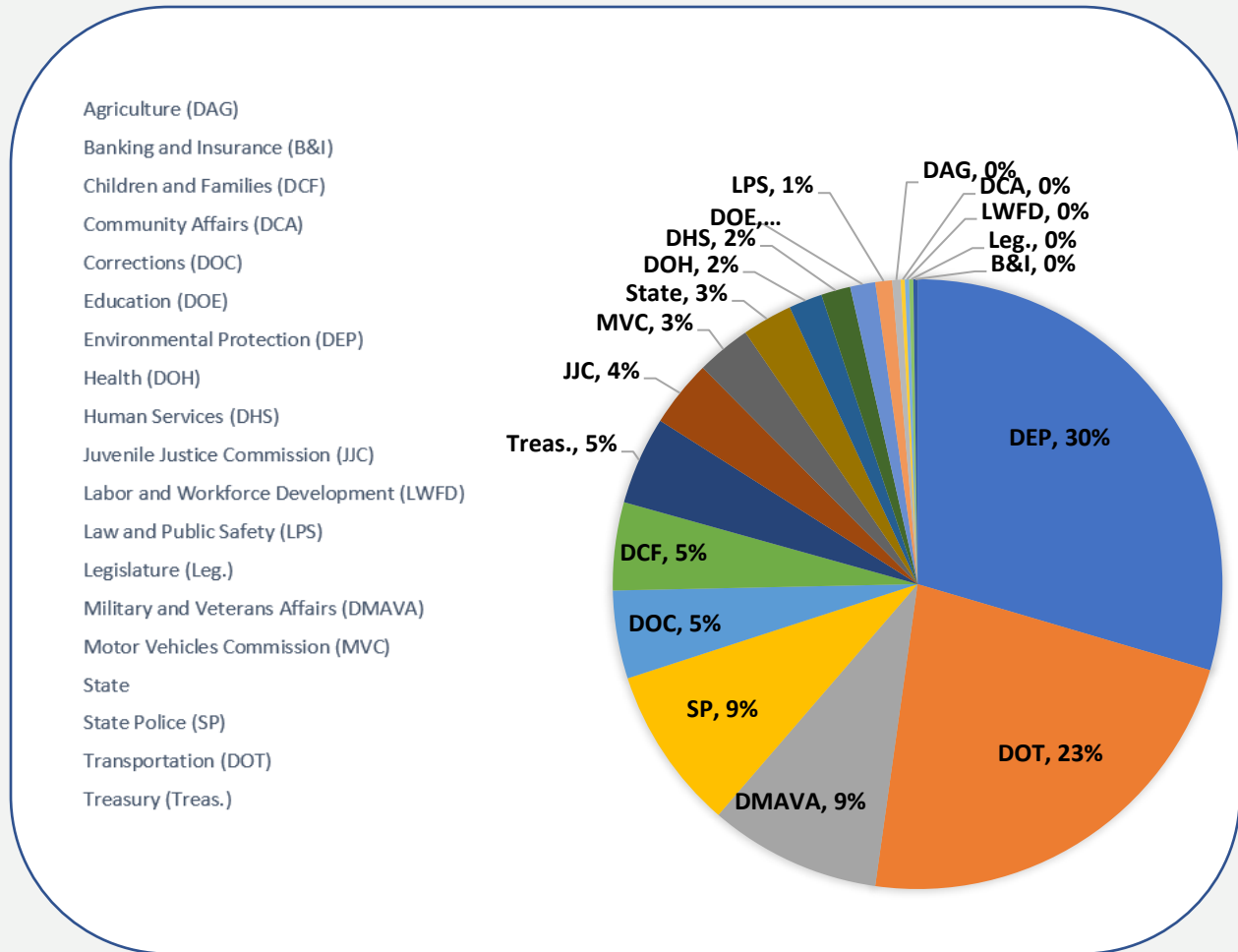


Figure 3 Percentage of Properties Per Agency

Top 5 Agencies

The Top 5 agencies by the number of properties, buildings, and square footage are shown in Table 2. The New Jersey Department of Environmental Protection (DEP) has the most number of properties and buildings and the second largest square footage. The New Jersey Department of Corrections (DOC) has just 5% of the properties, but 16% of the buildings, and 21% of the square footage. The DOC is the largest consumer of energy, which is expected as it runs secure locations around the State that require continuous operation for the inmate population. The New Jersey

Department of Transportation (DOT) is ranked second for number of properties and the third most number of buildings. Other agencies with a large building stock include the New Jersey Department of Military and Veterans Affairs (DMAVA), the New Jersey Department of Human Services (DHS), and the New Jersey Department of Health (DOH).

Properties (450)	Buildings (3,700)	Square Footage (30,000,000)
DEP, 30%	DEP, 41%	DOC, 21%
DOT, 23%	DOC, 16%	DEP, 16%
DMAVA, 9%	DOT, 13%	DMAVA, 9%
SP, 5%	DHS, 6%	DHS, 8%
DOC, 5%	DOH, 5%	DOH, 8%

Table 2 Top 5 Agencies based on the number of properties, buildings, and square footage

The Department of Treasury (Treasury) is responsible for the bulk of State properties, while individual agencies have responsibility for a smaller portion of the portfolio.

The State portfolio includes 24/7/365 facilities as well as commercial-type buildings, museums, public buildings, and more. Nearly 70% of the portfolio is made up of campus properties with two (2) or more buildings.

Natural gas is the primary commodity for heating throughout the portfolio. One unique aspect of the portfolio is properties in downtown Trenton rely on the Trenton Thermal Energy District Network (TEDN) Loop for hot and chilled water. Many of these properties are critical infrastructure and provide essential services during an emergency.

To understand the State portfolio, this report breaks down agency use as well as overall consumption/spend figures. Since there are variations in use, Staff uses the different metrics available (energy cost per square foot; consumption; energy intensity; energy efficiency ratings; etc.) to examine energy at an agency. The State Energy Capital Committee (ECC) is made up of representatives of various divisions of Treasury and BPU. The ECC works to upgrade and plan for energy efficiency projects at all types of State facilities. Forward planning allows the ECC to prioritize large energy performance contracts as well as strategic upgrades to reduce a facility’s overall energy consumption. It also takes into account how goals and mandates, budget constraints, personnel training and buy-in, as well as emergency needs, impact each agency’s ability to deploy energy management.

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SUCCESS STORIES**

**Ewing Headquarters
Department of
Transportation**

This is a campus-type environment. The district steam system heated 814,997 square feet made up of 37 buildings. The main project was decentralization of the steam system into localized-gas fired boilers. This resulted in the reduction of 377,691 kWh of electricity and 68,190 MCF of natural gas. This resulted in a savings of \$1,274,833.

Energy Cost and Consumption by State Agency

During FY21, just five (5) agencies accounted for more than 85% of the energy cost and consumption. A breakdown of the cost consumption for each agency is listed in Table 3. The portfolio for Treasury includes State-owned and leased buildings where utilities are paid by the State.

Consistent with overall trends, nearly all State agencies reduced energy consumption in FY21 compared to the baseline. A majority of the agencies also reduced consumption compared to the prior year. These reductions can be seen across the agencies in Figure 4. Many of the State’s largest agencies – based on the number of properties, number of buildings, square footage, energy intensity, and costliness – achieved consumption savings in excess of 20%. Agencies such as DOC, DOH, and DEP achieved savings in excess of 30%.

Agency	FY21 Total Energy Cost [US\$]	Percentage of Energy Cost	FY21 Total Energy Consumption [MMBTU]	Percentage of Energy Consumption
TREAS	\$ 32,146,980	34%	1,098,031	25%
DOC	\$ 20,523,582	22%	1,155,512	26%
DOT	\$ 11,689,914	12%	362,541	8%
DOH	\$ 9,386,419	10%	637,214	15%
DHS	\$ 7,422,080	8%	484,148	11%
DMAVA	\$ 5,756,027	6%	314,299	7%
DEP	\$ 2,604,703	3%	102,440	2%
NJSP	\$ 2,425,133	3%	76,972	2%
JJC	\$ 1,625,996	2%	85,104	2%
DCF	\$ 448,759	0%	11,545	0%
DOE	\$ 404,680	0%	26,083	1%
BUD	\$ 243,738	0%	8,462	0%
DSS	\$ 209,390	0%	7,393	0%
DCA	\$ 39,886	0%	1,871	0%
AGR	\$ 923	0%	22	0%
	\$ 94,928,208		4,371,638	

Table 3 Energy Cost and Consumption by Agency (FY21)

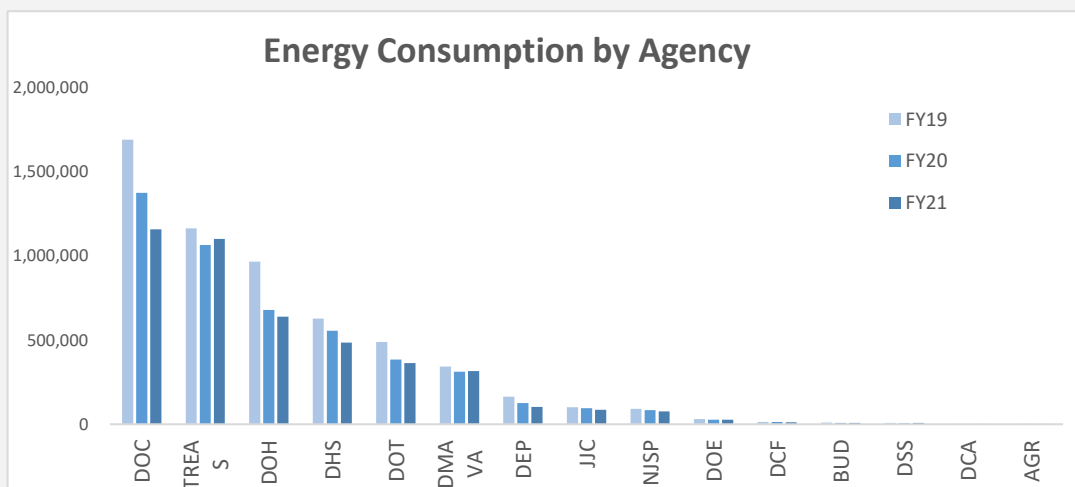


Figure 4 Energy Consumption by Agency (FY 2019 to FY 2021)



Forward Planning

The Murphy Administration is committed to fighting climate change and preparing New Jersey for a clean energy future. As the State looks to lead by example, the portfolio of State facilities and transportation fleets will need to embrace energy efficiency and grid-interactive efficient buildings. While the State saw the return of employees to the office in FY22, the pandemic is still not resolved. In addition, agencies must start to implement electrification plans and benchmark facilities this year. This requires continuous planning and evaluation of our current energy needs and technology.

The State's strategic energy management plan will continue to be multifaceted. This includes meeting goals and mandates, auditing facilities, planning for energy conservation measures that are specific and comprehensive, and training staff to manage and plan a facility's energy impacts. The continued implementation of energy performance contracts will allow for budget-neutral energy conservation upgrades at major facilities. The SES will assist in the planning and implementation of mitigation strategies to help agencies continue to realize energy savings.