



**CAPE MAY COUNTY  
BOARD OF CHOSEN FREEHOLDERS**

William E. Sturm, Jr. Administration Building,  
4 Moore Road, DN 402,  
Cape May Court House, NJ 08210

**CAPE MAY COUNTY  
ENERGY MASTER PLAN**

Provided by  
**CONCORD ENGINEERING GROUP**

520 SOUTH BURNT MILL ROAD

VOORHEES, NJ 08043

[www.ceg-inc.net](http://www.ceg-inc.net)

PROJECT No. 1C07038

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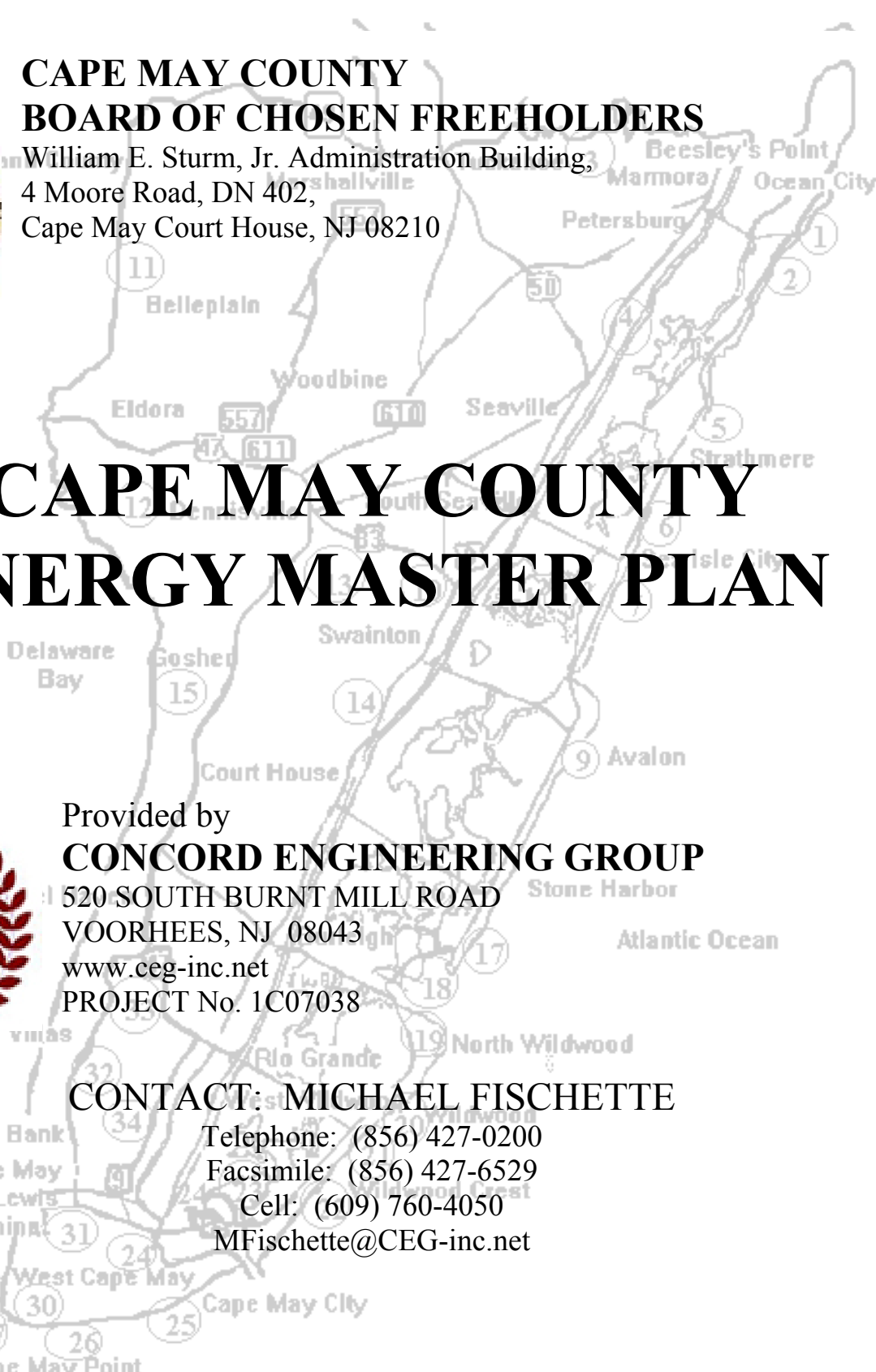
[MFischette@CEG-inc.net](mailto:MFischette@CEG-inc.net)



Town Bank  
North Cape May  
Cape May Lewis  
Ferry Terminal

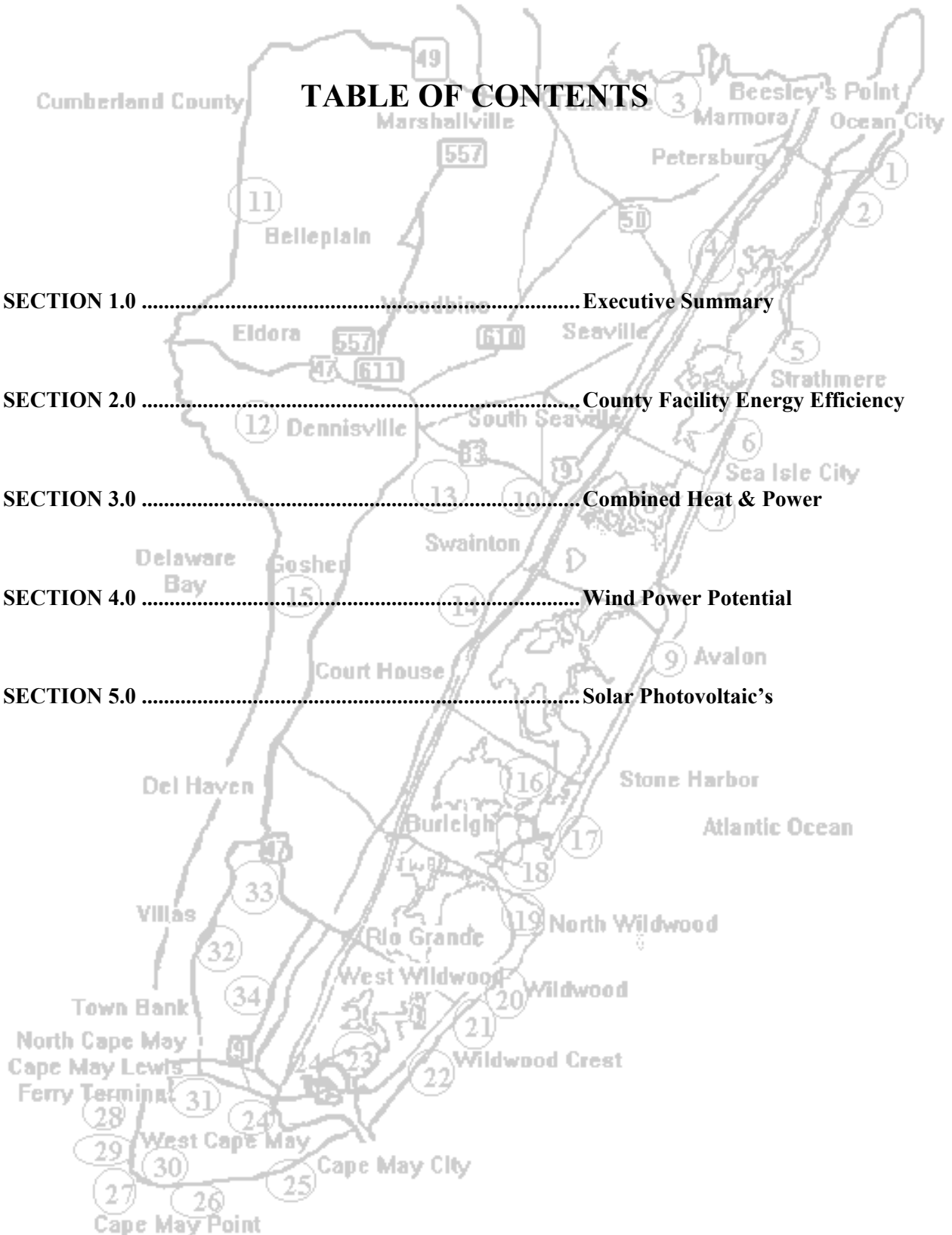
West Cape May

Cape May City  
Cape May Point



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## Section 1 - Executive Summary

Cape May County (CMC) is located in the southern most tip of New Jersey. Largely rural, the County has extensive shoreline in New Jersey. Consequently, beach, marshland and farmland protection as well as tourism are important concerns. Because of its sensitivity to the environment, and unique geographic location, the County has placed a high priority on environmental stewardship, renewable energy and energy efficiency as a means to protect its natural resources and provide an example of “green action” for the residents and businesses of CMC. In order to properly manage their costs, improve energy efficiency, and initiate a proactive mentality at the County, a comprehensive Energy Master Plan was commissioned to Concord Engineering Group, Inc of Voorhees N.J. This plan is as much a commitment, in that the County intends to be the leader in New Jersey for renewable energy and building efficiency. This goal is a “top down” commitment which will be self evident in all decisions at the very highest level in the County Administration. Initially, the County intends to concentrate on its own properties and facilities, in order to set a standard of excellence that can be emulated in the future by municipalities and private residences and businesses. Long term goals shall also be defined to provide incentives, training, and guidance to develop clean energy projects as well as promote the clean energy service and manufacturing sector in the County.

### Global Energy Challenges

The years 2007 and 2008 have been significant in that the “Energy Crises” has become a household word. The cost of imported oil increased 100%, creating a shock wave that affected gasoline, diesel oil prices and related energy sources like natural gas, propane and electricity. Natural gas and electricity currently cost twice what the prices reflected in 2003, proving that the volatility of imported oil has a cascading affect on all forms of energy. Additionally, products and services that are particularly sensitive to energy costs have also been affected. To compound this condition, the realization that greenhouse gases (GHG’s) from fossil fuel combustion is a direct cause of global warming has become an accepted school of thought in the international community. Consequently, major changes in the way countries produce energy is underway. New markets and technologies are being developed with some maturing at an exponential rate. The two challenges we face on a global level is the need to diversify the world’s major source of energy away from oil, and the need to reduce carbon emissions which are major sources of GHG’s.

### National and Regional Challenges

The United States is the world’s largest energy user. The Northeast and Mid-Atlantic region is the most densely populated area of the country. These regions have taken steps to reduce the reliance on coal burning power plants (the largest GHG emitter), by increasing the use of natural gas fired power plants. However, the pressure to buy less expensive power from Midwestern coal fired power plants is significant. Federal legislation has been introduced to create markets and programs that will meet global objectives already adopted by most of the international community. The federal plan creates “carbon credits” which will be a new market that is intended to reward clean energy sources by generating credits that can be auctioned or sold to entities that have high carbon emitting power plants. This creates a reward and penalty system that should make cleaner forms of energy production more financially desirable.

On a regional scale, the Northeastern and Mid-Atlantic states (except for Pennsylvania) have adopted the Regional Greenhouse Gas Initiative (RGGI). This legislation will provide a clearinghouse to manage the market for carbon credits in New Jersey. In essence, power plants that generate electricity from renewable sources like wind or nuclear that do not emit GHG's, will generate credits and have an additional value from the carbon credit revenues, while coal fired power plants and older, inefficient oil and gas fired power plants will be required to purchase carbon credits because of their large GHG emission rates.

The issues of energy diversification and GHG emissions are compounded due to an aging infrastructure. Transmission and Distribution (T&D) systems for electric power are particularly strained causing serious reliability issues that affect home security as well as the cost of doing business. Unreliable electricity is not an option for most businesses, particularly hospitals and data centers. The result is an unacceptable premium for use of the T&D system during peak hours. The Northeast and Mid-Atlantic regions are in dire need to upgrade and expand their electrical infrastructure, however the ability to secure "right of ways" will be a time consuming challenge that will certainly extend the achievement of such goals. To increase reliability states have interconnected power lines between large power plants. Because this crosses state boundaries, it is therefore governed by the Federal Energy Regulatory Commission (FERC). To manage multi state transmission lines in the Mid-Atlantic region, an independent system operator was created from the seven original utilities that formed the partnership. The Pennsylvania Jersey Maryland (PJM) Interconnect, LLC was formed so that reliable power and cost containment could operate in a free market, non regulated environment. The PJM is responsible for taking prices for electricity from power plants and selling such power to users such as brokers, marketers and utilities. Ultimately the PJM manages in real time the amount of power transmitting through T&D systems to ensure that lines are not overloaded and the infrastructure remains reliable.

### **New Jersey Energy Master Plan (EMP)**

New Jersey has always been at the frontline for innovation and policy related to energy issues, along with other proactive states such as California and New York. In 1999 the Electric Discount and Energy Competition Act (EDECA) passed, this legislation forced utilities to divest power plant production and remain only a regulated distribution and metering company. The bill provided competition in New Jersey so that customers could choose who they buy gas and electricity from. The bill also provided a universal charge to all customers that would fund energy efficiency and renewable energy programs. The Societal Benefits Charge is a component of all electric and gas bills that enables these programs to provide rebates, grants and incentives for the customers who implement them. More recently the current administration has taken an aggressive role in global issues as well as energy cost issues. Numerous Executive Orders and legislative bills have been enacted to set standards for GHG reduction, improve reliability of our T&D system and ultimately reduce the cost of energy in New Jersey. A listing of the significant legislation is delineated in Appendix B.

New Jersey's Energy Master Plan will be finalized in October, 2008. After numerous stakeholder meetings and hard work the EMP will provide a guideline that identifies the "Challenges", "Goals", and "Action Items" that will set a course for New Jersey Energy Policy. A summary of the NJEMP is as follows:

## CHALLENGES

- **Energy Demand has Outpaced Supply.** Most critical is the Electric Peak demand periods. For less than 50 hours per year the electric grid is operated at maximum limits. The need to expand T&D lines and build more power plants is expensive to satisfy this short duration. Therefore a major challenge in New Jersey is to reduce electric demand during peak periods.
- **Energy Prices have doubled in the last 5 years.** The movements toward cleaner burning fuels such as natural gas have created upward pricing pressure. Additionally, the volatility of natural gas is a major concern as was proven during the price spikes following hurricane Katrina. Electric markets have seen large increases due to PJM pricing models to increase reliability in addition to fuel costs. Currently the PJM has been responsible for a 15-20% increase in electric prices above that related to fuel costs.
- **Global Warming.** Currently the PJM has a portfolio of different fuels to provide electricity to New Jersey. Power plants consisting of nuclear, coal, natural gas dominate the supply. However, because the PJM is a regional group, some states that rely heavily on coal are called upon to supply electricity based on the lower pricing. This undermines New Jersey's efforts to reduce GHG's. New Jersey needs to develop non GHG emitting power plants such as nuclear and efficient power plants such as Combined Heat & Power plants (CHP). CHP plants operate at twice the efficiency of conventional plants and therefore emit one half the GHG's for the same amount of useful energy (i.e. electricity and heating or cooling energy).

## GOALS

- **Increase Energy Conservation and Energy Efficiency.** This is undeniably the most cost effective way to help achieve goals. New Jersey has set a goal of reducing energy consumption by 20% in 2020. New legislation has been introduced to modify current state building codes so that they are required to be 30% more efficient than the current building code. Additionally, a state requirement for minimum energy efficiency standards for appliances has also been initiated. Finally, programs to increase awareness of energy efficiency through education and outreach programs will be implemented.
  - *Action Item 1 – Redesign current state energy efficiency programs and increase funding.*
  - *Action Item 2 - Work with Legislature to modify building codes so that energy efficiency shall be 30% lower than current building code. (Bill S702)*
  - *Action Item 3 – Work with Legislature to create minimum efficiency standards for appliances, such as commercial hot food cabinets, DVD players, walk in refrigerators, etc. (Bills A1763, S1253)*
  - *Action Item 4 - Increase public education and outreach programs by creating Industry specific Best Practices Manuals on energy efficiency, localized workshops and individual consultation from the BPU. Create a partnership of private, local government, K-12 schools to modify education programs for energy efficiency awareness.*

- **Reduce Peak Demand.** The best way to reduce peak demand is to allow the customer to see the real time cost of electricity throughout the day. Currently, only very large customers are forced to buy electricity on the CEIP rate. This rate changes price hourly as posted on the PJM. This provides customers with feedback, to see the consequences of their energy use. New legislation will reduce the threshold for this rate to customers with peak demand of 600kw or larger (This amounts to a typical 60,000 sf office building). Additionally, residential customers will ultimately see “Smart Meters” in their homes which will provide the feedback necessary to allow homes to alter the time of their energy use, as well as provide some load shedding during peak periods. At the requirement of the FERC, the PJM has implemented a Demand Response program that pays customers to curtail loads or add standby generation during the peak demand events. New Jersey will look to supplement this program to further encourage Demand Response (DR).

- *Action Item 1 – Modify real time rates to include smaller account sizes to increase awareness.*
- *Action Item 2 – Expand participation in PJM Demand Response programs by providing incentives to get customers to join.*
- *Action Item 3 – Inverted Tariffs that increase the cost of electricity during periods when it is most expensive so that the customer has more feedback on the cost of when electricity is used.*
- *Action Item 4 - Smart Grid infrastructure that allows two way communication between the utility and the customer load so that periods of peak demand can alert customers to take action manually or automatically cycle loads such as air conditioners.*
- *Peak Demand Reduction monitoring of various programs to see which are most effective in achieving goals.*

- **Increase States Renewable Power to 22.5% of the total supply by 2020.** The New Jersey Renewable Portfolio Standard was enacted to mandate a schedule of increasing percentage of renewable power in New Jersey. Suppliers who sell electricity in New Jersey are required to prove that the scheduled percentage of their power is from renewable technologies such as wind, solar, biomass, tidal, wave and geothermal. New Jersey’s rebates have been the most aggressive in the country. Today, a transition to a market based incentive has been implemented which looks to sell Renewable Energy Credits (REC’s) from these power plants to supplement the revenue stream. It is anticipated that as the requirement for Renewable Power increases from the schedule defined in the RPS the price for the REC’s will increase and make the technology more cost effective.

- *Action Item 1 – Complete the transformation from rebates to market based REC program.*
- *Action Item 2 – Develop Wind Power onshore and offshore on a large scale.*

- *Action Item 3 – Increase biofuels and biomass projects, including landfill and sewage digester power plants, food waste biomass production, etc., by alleviating regulatory concerns. Establish bioenergy enterprise zones around concentrated biomass feed stocks.*
- **Increase supply from low carbon emitting and high efficient power plants.** The state has set a goal of 1500MW of new Combined Heat & Power (CHP) power plants in New Jersey by 2020. Incentivizing small power plants that utilize the waste heat from the electric generation process to provide heating and cooling energy effectively double the efficiency over conventional large central station plants. Additionally, CHP plants are smaller and easier to permit and can be ready for operation in as little as one year. CHP plants distributed throughout the state will also reduce peak demand and increase reliability, since power is generated at the source and reduces stress on T&D infrastructure. New Jersey will look to expand large low carbon power plants such as nuclear to meet the needs of the growing demand in New Jersey. However, the time frame for commercial operation of new nuclear plants is a minimum of 10 years.
  - *Action Item 1 – Support investment by providing low interest loans, long term financing and public private partnerships. Create a State Energy Council chartered to address siting and financing of new power plants as well as target energy plant investment in high congestion electric transmission line areas.*
  - *Action Item 2 – Develop incentives for Combined Heat & Power plants (CHP), specifically streamlining regulatory conflicts, funding CHP projects from the Retail Margin Adder funds and exempt CHP gas from Sales & Use Tax.*
  - *Action Item 3 – Create new generation power plants that meet all Energy Master plan Objectives including cost, such as clean coal and carbon sequestration and nuclear plants.*
- **Invest in clean energy technologies and business to create jobs and stimulate industry.** Since New Jersey is well positioned to capitalize on the emerging clean energy sector, funding support such as the Edison Electric Fund and the Economic Development Authority (EDA) will be dedicated to the development of new clean energy businesses and projects. Additionally, a Green Collar Job Training program will be instituted to cultivate and train New Jersey’s work force in these new clean energy businesses.
  - *Action Item 1 - Expand Edison electric fund as administered by EDA to support clean energy service and manufacturing, by providing R&D support, gap funding, equity investments and creating general market demand. \$75 million over 5 years will be earmarked to attract over \$200 million in private venture capital for clean energy technologies*
  - *Action Item 2 – Develop Green collar job training programs by modifying current curricula to provide industry recognized credentials in schools and higher education.*
- **New Jersey State Facilities must lead by example.** The State will be chartered to demonstrate leadership in building energy efficiency, renewable energy, peak demand reduction and GHG reduction for its facilities. Creation of the Office of Energy Savings will be charged with the

implementation of programs to execute the goals of the NJEMP. This will in turn provide other public entities in the state with the guidance to follow suit.

- *Action Item 1 – Operate State facilities as efficiently as possible. Specifically by conducting energy audits, implementing energy conservation projects, state recycling programs and a state wide Energy Utilization Index (EUI) tracking system so that departments can be held responsible for the efficiency of each facility.*
- *Action Item 2 – Implement cost effective energy efficiency projects throughout the state.*
- *Action Item 3 – Implement energy Performance Contracting projects that pay for themselves from the savings incurred.*
- *Action Item 4 – Increase energy supply by building CHP plants and utilizing biodiesel.*

## **CAPE MAY COUNTY ENERGY MASTER PLAN**

For the County to effectively address the challenges facing it, a thorough understanding of the global, national, regional and state goals and objectives must be considered. In this way a synchronized effort can ensure that the County initiative is in concord with the rest of the nation and the state. New Jersey's Energy Master Plan as well as federal legislation that promotes renewable energy, energy efficiency and biofuels is an integral part of the County's ability to implement a successful program. Therefore the County Energy Master Plan shall closely follow the format of Challenges, Goals and Action Items so that resources developed by federal and state government can be exploited. Cape May County is unique to New Jersey in several ways; capitalizing on its resources and geographic location will be integral to making the County the leader in the State of New Jersey for certain initiatives.

### **COUNTY CHALLENGES**

- Cape May County has experienced substantial growth and foresees continued expansion. Development of the shore municipalities, in particular Wildwood, Wildwood Crest and Cape May will continue to influence where businesses and residences expand. Given the geographic location, Cape May County is obviously at the end of the electric and gas infrastructure for Atlantic City Electric and South Jersey Gas. While both utilities have introduced future master plans to expand service and increase reliability; the funding, right of ways, and regulatory obstacles will clearly make this a lagging not a leading initiative.
- In order for the County to attract new business and keep its current business from leaving the cost of energy must be contained. Cape May County needs to benefit from its unique geographic advantage and develop a means to make less expensive and environmentally prudent electric power available to its residents. The unique advantage of large scale wind power offshore, and farmland-based inshore wind power, offer significant advantages. The CMCMUA has taken a leading role in this area by developing its own power plant from landfill methane at the County's landfill. The CMCMUA has also taken the initiative to retain a wind power consultant to consider several County-owned sites for wind turbine placement. However, wind power is not being developed to its fullest potential.

- The County has a responsibility to enforce strong commitment to reducing global warming because of its extensive shoreline, and huge economic impact from rising ocean levels. Reducing the carbon footprint of the County will be a necessity.
- The County needs to lead New Jersey by example. It must demonstrate an aggressive approach to implementing all forms of energy efficiency projects and promotion of clean energy technologies.
- The County could greatly benefit from the promotion of clean energy service and manufacturing business that would create tax base and jobs, in a new and rapidly growing market sector that would suit Cape May County's location and demographic well.

## GOALS

- The County should provide incentive and actively pursue and develop wind power, CHP, Solar PV and biomass power plants through public private partnerships and Power Purchase Agreements. Cape May County shall be the States leader in land-based wind power plant development in New Jersey.
  - *Action Item 1 – Wind power is economically viable in the County. While offshore projects are larger in scale (greater than 100MW), mid to large scale projects (40-100MW) provide a greater opportunity because land is available and the economies of scale are maintained. The County needs to work with wind power developers to consider inland and inshore wind power projects and support them in overcoming the major obstacles of land purchase, permitting and purchase of the power generated. The County will initiate a forum of discussion with private wind developers to aid in project development immediately. Advertisement and RFQ for wind developers shall be initiated immediately.*
  - *Action Item 2 – New Jersey's solar PV program is among the most aggressive plan in the country. Recently the NJBPU restructured the solar PV program from heavily financed lump sum rebates to a market based incentive where Solar Renewable Energy Certificates can be traded as a separate revenue stream from the electricity produced. The County can adopt a solar PV program for its facilities utilizing power purchase agreements (PPA's). Recent legislation passed by Gov. Corzine allows public entities to enter into PPA's for up to 15 years. The solar PV developers would own and install PV equipment at their cost in the County facilities. The County would agree to purchase the power generated at a discount from current electric rates. An RFP for Solar PPA agreement shall be generated immediately to allow Solar PV developers to submit proposals. This contract could be expandable to the municipalities in the County.*
  - *Action Item 3 – Combined Heat & Power (CHP) is one of the most promising technologies supported by the NJEMP, to meet the challenges of rapid electric growth and electric transmission overloading. CHP plants are smaller and twice the efficiency of large scale power plants. Therefore, they can be placed in operation in less than two years, and can reduce energy cost and increase efficiency by providing twice the energy than a typical power plant. Because the CMC is at the end of the line in the*

*transmission system, reliability of the electric system will be increased since the power is generated locally. A study for a CHP plant at the County Complex has been completed proving strong economic viability. The County will pursue this project actively and take advantage of newly appropriated rebates and NJEDA financing. A meeting will be held with ACE, CMCMUA and the County consultants to develop concepts. Within 6 months the County shall pursue preliminary engineering RFP for the CHP plant.*

- *Action Item 4 – Biomass is a leading technology that allows the use of existing organic matter to be converted to usable fuel or electricity. The CMCMUA has successfully developed power plants from the existing landfill and currently exports additional landfill methane gas to the NJ Dept Treasury at Woodbine Development Center. Other forms of biomass such as waste wood burning, degasifying organic matter, sewage plant digester gas, and the refining of waste cooking oils from local kitchens, restaurants and food processing plants should be expanded. The County will empower the CMCMUA to maximize the conversion of all landfill and sewage digester gas plants within the County, pipeline quality gas and electric power plant. The CMCMUA will also develop a waste cooking oil program to collect, refine and sell waste cooking oils as fuel.*
- The County has already undertaken a full scale energy audit for its existing facilities, identifying energy conservation measures that will greatly improve the efficiency of the County buildings while still remaining a cost effective project. Consequently the County needs to dedicate resources and funding to implement these projects as soon as possible using all possible means of funding from local, state and federal sources.
  - *Action Item 1 – The County needs to initiate an RFP to secure a performance contractor to install and guarantee savings identified in the Energy Audit. New legislation allows the County to enter into a 15 yr term contract. In the event the County chooses to use available funds the County should enter into a Performance Contract (PC) without financing to ensure energy savings are met.*
- The County shall set an example as the first County in New Jersey to be carbon neutral within 5 years. This will be accomplished by implementation of all energy conservation projects initially. The remaining carbon emissions shall be offset by the purchase of Renewable Energy Credits (REC's) and power purchase agreements from renewable generators.
  - *Action Item 1 – Utilizing the Energy Audit results develops a carbon footprint for the County and timeline for carbon reduction. To supplement the carbon reduction programs already proposed the County shall procure wind energy and renewable energy credits (REC's) that is economically viable. The County shall contact a RE broker or consultant to develop procurement RFP for up to 25% of the County's electric usage within 1 year.*
- The County will adopt new procurement standards for professional architectural and engineering services as well as service and installation contractors, so only that firms who demonstrate strong commitment and experience to energy efficiency and sustainable design are contracted for County work.

- *Action Item 1- Obtain the services of an independent LEED accredited architectural consultant who can prepare the language needed to guide County Purchasing in the qualifications needed. Consult with the County energy consultant to include energy qualifications for all mechanical electrical plumbing design services and equipment minimum requirements. Guidelines shall be prepared for all County facility project scopes of work to meet minimum standards for efficiency and sustainability.*
- The County will actively promote and attract clean energy sector businesses to develop business in the County as well as work closely with County College and Vocational School as well as K-12 educators to support clean energy certifications and curricula.
  - *Action Item 1 – The County needs to actively train and support the growth of energy efficient and renewable energy technologies. Therefore, to support municipalities in the County a committee charged with supporting the enforcement of these programs will be created to provide guidance and funding for projects*

**Section 2 – County Facilities**

CMC currently has over 1 million square feet of facilities, including the Special Services and Vocational school. This includes general office, courthouse, prison, nursing home, libraries, utility buildings and maintenance buildings. As shown in the list below:

| Qty. | Building                              | Address              | SF    |
|------|---------------------------------------|----------------------|-------|
| 1    | Prosecutors/Task Force                | 110 Justice Way      | 41166 |
| 2    | Animal Shelter                        | 112 Shelter Way      | 8613  |
| 3    | Nursing Home                          | 12 Moore Road        | 95669 |
| 4    | MIS North/Records                     | 130 Justice Way      | 1721  |
| 5    | Sheriffs Office                       | 15 Holmes Road       | 3114  |
| 6    | Youth Shelter                         | 151 Crest Haven Road | 10800 |
| 7    | Diagnostic Training & Opportunity Ctr | 152 Crest Haven Road | 12991 |
| 8    | Public Safety Training Center         | 173 Crest Haven Road | 13626 |
| 9    | Health Dept                           | 6 Moore Road         | 31229 |
| 10   | Correctional Center - k9 Bldg         | 64 Holmes Creek Road | 3879  |
| 11   | Police Academy Dormitory              | 1 Holmes Creek Road  | 4482  |
| 12   | Correctional Center - Jail            | 125 Crest Haven Road | 46872 |

| Qty. | Building                              | Address                          | SF     |
|------|---------------------------------------|----------------------------------|--------|
| 13   | F&S Warehouse - Crest Haven           | 3 Holmes Creek Road              | 3947   |
| 14   | Administration Building               | 4 Moore Road                     | 65634  |
| 15   | F&S Carpenters Shop - Crest Haven     | 5 Holmes Creek Road              | 1548   |
| 16   | F&S Maint Shop - Crest Haven          | 91 Holmes Creek Road             | 7000   |
| 17   | Technical School Service Station      | 178 Crest Haven Road             | 0      |
| 18   | Technical School                      | 188 Crest Haven Road             | 241084 |
| 19   | C.M.C. Education Center (Special Svc) | 148 Crest Haven Road             | 91846  |
| 20   | Nutritional Center                    | 155 Crest Haven Road             |        |
| 21   | Library Main Branch                   | 30 Mechanic Street               | 42900  |
| 22   | Wildwood Library                      | 6301 Ocean Avenue Wildwood Crest | 7000   |
| 23   | Cape May City Library                 | Ocean & Hughes Avenue            | 7000   |
| 24   | Woodbine Library                      | 801 Webster Street               | 3000   |
| 25   | Upper TWP Library                     | 2050 Tuckahoe Road               | 8033   |
| 26   | Lower TWP Library                     | 2600 Bayshore Road               | 7448   |
| 27   | Historic Court House                  | 11 North Main Street             | 8505   |
| 28   | Main Court House                      | 9 North Main Street              | 112028 |
| 29   | Napoleon Parking Lot                  | 16 E. Mechanic Street            | 0      |
| 30   | Bridge Commission Building            | 153 Crest Haven Road             | 5082   |
| 31   | Election Board                        | 10 Mechanic Street               | 7420   |
| 32   | Upper TWP Senior Center               | 1369 Old Stagecoach Road         | 3431   |
| 33   | Lower TWP Senior Center               | 2612 Bayshore Road               | 8584   |
| 34   | Extension Service                     | 355 Court House/Dennisville Road | 7181   |
| 35   | Naylor House                          | 605 Route 9 North                | 3305   |
| 36   | Fire Training Facility                | 165 Crest Haven Road             |        |
| 37   | Traffic Signal Shop                   | 155 Crest Haven Road             | 5082   |
| 38   | Lockwood Youth Center                 | 355 Court House/Dennisville Road | 7000   |

| Qty. | Building                            | Address                      |         | SF    |
|------|-------------------------------------|------------------------------|---------|-------|
| 39   | Road Dept Heavy Equip Shop #7       | 1250 Langley Road, Erma      |         | 13290 |
| 40   | Bridge Dept Traffic Sign Shop #96-1 | 1280 Hornet Road             |         | 5082  |
| 41   | Road Dept Office #107               | 501 Saratoga Road, Erma      |         |       |
| 42   | Road Dept - Storage Bldg #4         | 521 Wasp Road, Erma          |         |       |
| 43   | Bridge Dept - Woodbine              | 536 Woodbine-Ocean View Road |         | 8870  |
| 44   | Road Dept Fleet Maint Shop #13      | 555 Saratoga Road, Erma      |         | 8471  |
| 45   | Fare Free/ New Bldg #100            | 6 Forrestal Road, Erma       |         | 1943  |
| 46   | Fare Free Meals on Wheels           | Hornet Road, Erma            |         | 1943  |
| 47   | Election Board Warehouse #5         | 1390 Langley Road, Erma      |         | 9369  |
| 48   | MOSQ Admin Building                 | 15 Route 47 Dias Creek       |         | 8449  |
| 49   | MOSQ Caretaker's House              | 15 Route 47 Dias Creek       |         | 864   |
| 50   | MOSQ Vehicle Shop                   | 15 Route 47 Dias Creek       |         | 2152  |
| 51   | MOSQ Storage Bldg #2                | 15 Route 47 Dias Creek       |         | 2000  |
| 52   | MOSQ Quonset Hut                    | 15 Route 47 Dias Creek       |         | 4848  |
| 53   | MOSQ Hangar Building                | 15 Route 47 Dias Creek       |         | 2692  |
| 54   | MOSQ Storage Bldg #1                | 15 Route 47 Dias Creek       |         | 2000  |
| 55   | Erma Volunteer Fire Dept            | 1108 Lexington Road          | REMOVED | 0     |
| 56   | Lower TWP Public Safety Building    | 1389 Langley Road            | REMOVED | 0     |
| 57   | Ocean City Senior Center            | 3304 Bay Avenue              | REMOVED | 0     |
| 58   | Bridge Dept - Ocean City            | 34th Street Bridge, Marmora  | REMOVED | 0     |
| 59   | Everlon Building #95                | 373 Franklin Road, Erma      | REMOVED | 0     |
| 60   | Binder House                        | 427 Route 9 North            | REMOVED | 0     |
| 61   | F&S Maint Shop - Airport            | 501 Ranger Road              | REMOVED | 0     |
| 62   | Forgotten Warriors Veitnam Museum   | 529 Forrestal Road           | REMOVED | 0     |
| 63   | Pump Station #9                     | 1369 Langley Road            | REMOVED | 0     |
| 64   | Pump Station #6                     | 423 Saratoga Road            | REMOVED | 0     |

| Qty. | Building                           | Address                       |         | SF        |
|------|------------------------------------|-------------------------------|---------|-----------|
| 65   | Bridge Dept - Stone Harbor         | 529 Forrestal Road, Erma      | REMOVED | 0         |
| 66   | Road Dept/Quonset Hut #105         | 535 Ranger Road, Erma         | REMOVED | 0         |
| 67   | Women's Commission                 | 10 N. Main Street             |         | 1024      |
| 68   | Park North                         | 1099 Shore Road, Palermo      |         |           |
| 69   | Park South                         | 1301 Bayshore Road, Del Haven |         |           |
| 70   | Broadley Board of Education        | 151 Toft Drive                |         |           |
| 71   | Park/Shed                          | 707 Route 9 North             |         |           |
| 72   | Park/Maint Bldg                    | 707 Route 9 North             |         | 2880      |
| 73   | Park/Med Bldg                      | 707 Route 9 North             |         |           |
| 74   | Park/Reptile House                 | 707 Route 9 North             |         | 6006      |
| 75   | Family Court Assessment Team       | 134 Crest Haven Road          |         |           |
| 76   | Records Recovery Building Woodbine | RT 550 Woodbine/Ocean View Rd |         |           |
| 77   | County Clerk & Tax Board           | 7 N. Main St.                 |         |           |
|      |                                    | TOTAL                         |         | 1,010,103 |

The County has undergone many energy initiatives with the most recent completed in 2003 which renovated several boiler plants and added state of the art building management and controls. A combined heat and power (CHP) study was performed in 2003 for the County complex which resulted in a favorable payback, this will be discussed later in this section. The primary contributors to the energy costs for these facilities are, Heating Ventilation and Air Conditioning, lighting, computers and office equipment. Energy costs are primarily electricity from Atlantic Electric Company (ACE) and natural gas from South Jersey Industries (SJI) other fuels such as diesel fuel and propane are also part of the cost but are not as significant. Utility meters at each facility measure the amount of energy used for each facility. Utility costs have risen dramatically for the County over the last 5 years. This can be attributed to the increased demand on natural gas and the global increase for foreign oil. Electric prices follow this price increase because of the major cost for electric generators is fuel. Other costs which reflect the current shortage of power in the Mid-Atlantic region grid (PJM) and the limited capacity to transmit power over the existing T&D lines have also contributed significantly. The County has seen a dramatic increase in electric pricing since 2005 (see Table 2 below). While natural gas prices have shown short term volatility electric pricing has steadily increased.

Table 2

| Cape May County Historic Utility Usage |                  | Gas Cost         | Percent Increase | Electric Cost      | Percent Increase |
|--|------------------|------------------|------------------|--------------------|------------------|
| 2005                                   |                  |                  | n/a              |                    | n/a              |
|  | <b>Total</b>     | <b>\$650,354</b> | <b>n/a</b>       | <b>\$1,260,936</b> | <b>n/a</b>       |
| 2006                                   |                  |                  |                  |                    |                  |
|  | <b>Total</b>     | <b>\$335,444</b> | <b>-49%</b>      | <b>\$1,449,783</b> | <b>-15%</b>      |
| 2007                                   |                  |                  |                  |                    |                  |
|  | <b>Total</b>     | <b>\$519,080</b> | <b>-20%</b>      | <b>\$1,652,527</b> | <b>-31%</b>      |
| 2008                                   |                  |                  |                  |                    |                  |
|  | <b>Total (1)</b> | <b>\$500,895</b> | <b>-23%</b>      | <b>\$2,003,725</b> | <b>-58%</b>      |

Note (1) – Data through August 2008 projected to Jan 2009

As part of this effort Concord Engineering performed energy audit walkthrough surveys for all County facilities and developed the following list of Energy Conservation Measures (ECM's) for each facility.

**Animal Shelter**

1. Install Photo sensors control system for exterior building mounted side wall lighting.
2. Install appropriate Lighting Occupancy Sensors in offices, storage closets, restrooms, and any other area that does not require all day lighting.
3. Install Programmable thermostat controls with nighttime setback and occupied/unoccupied controls.
4. Check operation of dog kennel area thermostat during cooling season and set to 80F for normal operation, and provide operation strategy night time setback to raise temperature set point to 90F.

**Prosecutors Office**

1. Retrofit existing 12 Warehouse, and 8 gymnasium 400 W HID with T5 High Bay type fixtures.
2. Replace existing 1988 vintage Bradford White 250 MBH Domestic Hot Water heater with new Bradford White Model EF100T250E3NA.

**Public Safety Training**

1. Indoor Shooting range options:
  - a. Replace existing 5 HP 87.5% efficient and 7.5 HP 89.5% efficient supply fan motors with new premium efficiency fan motors.

- b. Install new outdoor air handling unit with Plate and Frame heat exchanger to recovery exhaust heat and precondition outdoor air.

**Diagnostic Training Building**

1. Install new Outdoor air Reset controls on existing Weil McLain boiler.

**Youth Center**

1. Replace one existing State Water Heater Model SBT80500NE with one new High Efficiency Domestic Hot Water Heater. Keep one existing State Water heater for back up.
2. Digital Thermostat controls with occupied/unoccupied controls.
3. Lower set point on front lobby electric baseboard.

**Department of Health Building**

1. Replace existing Weil McLain 1425 MBH Boiler with new High Efficiency Hot Water Boiler with Outdoor air reset controls. (Possibly Split into two 750 MBH units for modular ability and some backup).
2. Replace existing AO Smith 670 MBH DHW Heater with new High Efficiency Domestic Hot Water Heater.
3. Refit existing air handler to a VAV System with hydronic reheats in boxes.
4. Fix existing temperature controls baseboard zone pump controls.

**Nursing Home**

1. Variable Air Volume Kitchen Controls on Hoods and Make up.
2. Premium Efficiency Motors on HW pumps.
3. Variable Volume Hot Water Pumping Controls
4. Premium Efficiency Motors on CHW pumps.

**Correctional Center #9**

1. Holding Cell Area Air Handlers:
  - a. CO2 Controls
  - b. Economizer Controls
  - c. Energy Recovery
2. Cell Area 150W HID square flush with wall, replace with T5 fixture.
3. Replace Existing Dishwasher with high efficiency unit, and gas booster heater.
4. Variable Air Volume Kitchen Hood Controls.
5. Electric DHW Heaters
  - a. Centralize DHW Loop

**CMC Police Dormitory**

1. Digital Thermostats with Unoccupied/occupied controls

## Warehouse #11

1. Retrofit existing 400W HID Lamps with T5 High bay fixtures.

## Administration Building #16

1. Remove existing Ice storage tanks, and install new high efficiency air cooled screw chiller.
2. Courthouse/Main Meeting Room rooftops with occupied/unoccupied controls, CO2 controls, and economizer controls.
3. Variable speed CHW Pumping. Convert system to Primary Secondary Pumping.

## Technical School

1. Variable Volume Hot Water Pumping
2. Premium Efficiency Motor Replacement
3. High Efficiency Condensing Boilers
  - a. Replace Room #115 AO Smith 670 MBH
4. Room #160 Rebalance exhaust hood and make up air system. Move hot water ceiling mounted cabinet heaters Thermostat to more centralized location.
5. Variable Air Volume Kitchen Hood Controls. Melink
6. Cafeteria Unit. Demand Based Ventilation, add VSD Fans
7. Natural Gas Fired DHW Dishwasher booster heater.
8. Upgrade existing dishwasher.
  - a. Insinger ADMIRAL44 replace with Champion Model 44 WS
  - b. Install Gas Booster Heater
9. New Thermostat controller with Occupied/Unocc Controls in Wood Shop
10. Gymnasium High Bay T5 retrofit
11. Gymnasium CO2 controls, and Occ/Unocc Controls.
12. Boiler Room #213 Replace existing Weil McLain with x3 Modular 1500 MBH Boilers.
13. Check Controls on Science Wing fish storage area. Make sure exhaust is controlled properly by temperature in room.

## Special Services School

### *George Bailey Wing*

1. Modular Boilers x3 2000 MBH
2. VSD Hot Water Pumping
3. New Pool Unit with Exhaust Energy Recovery for AHU-1. On Rooftop Dectron Unit
4. Gym Units CO2 Controls, VSD Drive Fans, AHU-3 to 5
5. Pool Area Lighting Retrofit from 400W HID to T5 technology, High Bay or Linear. Both Lap Pool and Therapy Pool.
6. Replace Existing Therapy Pool Heater with High Efficiency Pool Heater.
7. High Efficiency Pool Pump Motors.

### *1982 Vintage Wing*

1. New Domestic Hot Water Heater with Storage or Instantaneous System.

2. Retrofit Kitchen Booster heater to Gas booster heater.
3. Kitchen Variable Air Volume Kitchen Hood Controls. Add VSD Drives to Cafeteria Air Handlers.
4. Retrofit Dishwasher Booster heater with gas booster heater.
5. AHU-35 & 36 Premium Efficiency Motor replacement.

## **Cape May Libraries**

### ***Cape May City Library***

1. Lighting Retrofit – Remove existing 4 foot linear T12 technology with new 4 foot linear T8 technology. Approximately a total of 94 fixtures.
2. Install Outdoor air reset controls.
3. Replace condensing units with new high efficiency units.

### ***Wildwood Crest Library***

1. Look at possibility of switching to natural gas fired boiler for hot water and domestic hot water.

### ***Main Library Branch***

1. Possibility for shared CHW with court house.
2. Single Zone VAV conversion with CO2 Controls and VSD Supply Fans.

### **Main Court House**

1. Combine Chilled Water and hot Water with Main Library Branch.
  - a. Replace existing Trane chillers with larger Air Cooled York VSD Screw Machines rated at or above 260 ton Nominal.
  - b. Install “T” off of existing chilled water connection to library chillers and install underground piping to existing courthouse chiller plant. Install primary/secondary chilled water pumping distribution system with Variable Speed Drives.
  - c. Recycle Existing Library Chillers and Install at either Prison or Admin Building for reuse.
2. Install new economizer controls.
3. Reprogram occ/unocc, and nighttime set back controls so that outside air dampers closer 100%.
4. Staged Start up in morning on air handlers.
5. CO2 Controls on all air handlers with large OA.
6. Variable Primary CHW Pumping, replace existing 3-way valves with 2-way valves.
7. Convert Air Handlers 8 & 11 to single zone VAV system.
  - a. Install VSD Supple Fans
8. Convert existing inlet guide vanes to Variable Speed Drives.
9. Install Premium Efficiency Motors.

### **Extension Service Building (REMOVED)**

1. Replace existing Weil McLain Boiler, and install a new high efficiency heating boiler. Replacement can occur at end of boiler life.
  - a. Install outdoor air reset controls if possible on existing boiler.

2. Install Economizer controls on both outdoor air handling units.
3. Install occupied/unoccupied controls for Unit #1 which conditions large meeting/classroom space.

**Lockwood Youth Center**

1. Replace existing five Metal Halide HID 350 W lamps with T5 fluorescent technology.
  - a. Install dimmable ballasts and provide daylight dimming controls.

**Lower Township Senior Center**

1. Install Daylight dimming controls on 4' recessed linear fixtures for main activity room.

**Upper Township Senior Center (REMOVED)**

1. Install nighttime shut off controls on Electric Baseboard Heater, and ceiling mounted electric cabinet heater.
2. Replace existing Rheem rooftop unit with new high efficiency gas fired/DX cooling unit with economizer controls, unoccupied/occupied controls, and nighttime set back.

**Election Board Office**

1. Replace existing RUUD Gas fired water heater with new high efficiency instantaneous water heater.
2. Install Lighting occupancy sensors in offices and storage rooms.

**Traffic Signal Shop**

1. Replace six high bay 400 W HID lamps in storage area and replace with T5 high bay lamps.

**Bridge Commission Building (REMOVED)**

1. Replace existing Utica Boiler with new high efficiency boiler.
2. Install outdoor air reset controls on boiler.

**Fire Training Facility**

1. Install Lighting occupancy sensors in restroom, storage, classroom, and kitchen/lounge room.

**Road Department Garage Building #7**

1. Retrofit existing Metal Halide HID with fluorescent technology.
  - a. Can replace with Like T5 High Bay Technology.
  - b. Can replace with linear T8 Technology.

**Fare Free Meals on Wheels Office Building**

1. Replace existing Rheem 10 SEER condensing Units.
  - a. Replace two 3.5 ton units with new 13+ SEER Units.
  - b. Replace 4 ton unit with new 13+ SEER Units.
2. Confirm night time set back controls.

**County Services Building #13 (REMOVED)**

1. Replace existing Solaronics infra red gas heaters with new higher efficiency units.

**Gas Station/Garage Building #113**

1. Retrofit existing High bay Metal Halide HID fixtures with fluorescent technology. (T5 High Bay)
2. Fix existing Reznor Gas fired unit mounted in the ceiling to provide circulation air and heat for the garage. Keep existing gas fired radiant heaters for back up heat. Add greater than 60F heat shut off for garage area.

**County Road Department Building #4**

1. Move Thermostats off side of ceiling mounted units and move them back to wall mounted stats. Alter Fin deflection down more on Unit heaters. Thermostats should be un-programmable heat only with a set point of 50F.

**Fare Free Transportation Building #100**

1. Existing pole mounted plug in receptacles used for buses.
  - a. Place solar panels on Building roof and place solar batteries inside building or separate housing and distribute to receptacles so that utility feed is used as secondary feed. Roof of building can hold approximately 10 kW worth of solar panels. (Note this is better option)

**Mosquito Commission Administration Building**

1. Replace boiler with new higher efficiency oil fired boiler.
  - a. Replace with Propane fired boiler.
2. This building is a good candidate for Geothermal Heat Pump Conversion.
  - a. Need to insulate roof if this route will be taken though.
3. Replace existing four condensing units with new high efficiency 13 SEER units.
4. Facility could easily put in a Ground Mounted Solar System.

**Care Takers House (REMOVED)**

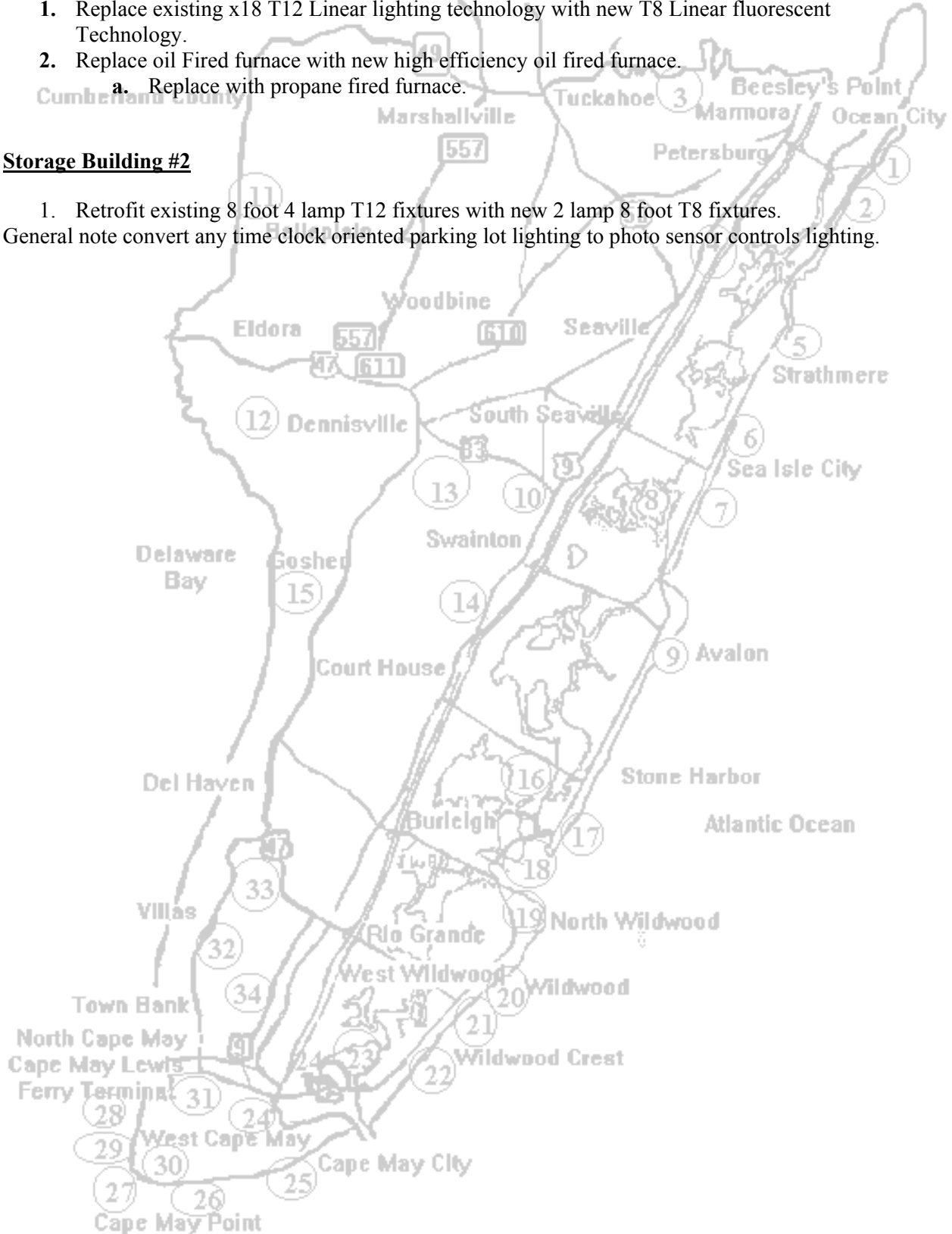
1. Replace small existing condensing with one newer 13+ SEER.

**Vehicle Storage Garage**

1. Replace existing x18 T12 Linear lighting technology with new T8 Linear fluorescent Technology.
2. Replace oil Fired furnace with new high efficiency oil fired furnace.
  - a. Replace with propane fired furnace.

**Storage Building #2**

1. Retrofit existing 8 foot 4 lamp T12 fixtures with new 2 lamp 8 foot T8 fixtures.
- General note convert any time clock oriented parking lot lighting to photo sensor controls lighting.



## BENEFITS OF ENERGY CONSERVATION IN COUNTY BUILDINGS

Based on the survey shown significant energy savings projects exist that could benefit the County with immediate reductions in electric and fuel costs. To illustrate the potential the top ten high energy use facilities were analyzed in detail to estimate savings. The result is a 15.60% reduction in electric and natural gas costs as shown in Table 3. Additional savings in maintenance and operations will also be realized from newer more efficient equipment. It is estimated that a comprehensive building efficiency program can yield a 20% reduction in energy costs when all facilities are included.

**Table 3 – County Facility Energy Conservation projects**

| Estimated Energy Conservation Measure Savings |             |  | 10 High End 2007 Utility Usage Buildings Considered |                             |
|---|-------------|--|---|-----------------------------|
|   |             |  | 173 Crest Haven Road                                | PUBLIC SAFETY TRAINING CTR  |
| Total Utility Bill (Gas & Electric)           | \$1,398,712 |  | 30 Mechanic Street                                  | LIBRARY - Main Branch       |
|   |             |  | Hornet Road, Erma                                   | FARE FREE - Meals on Wheels |
| Lighting Savings                              | \$50,354    |  | 6 Moore Road (2 meters)                             | HEALTH DEPT                 |
| HVAC Savings                                  | \$167,845   |  | 112 Shelter Way                                     | ANIMAL SHELTER              |
| Total   | \$218,199   |  | 125 Crest Haven Road                                | CORRECTIONAL CENTER - Jail  |
| Percent Savings                               | 15.60%      |  | 110 Justice Way                                     | PROSECUTOR'S/TASK FORCE     |
|   |             |  | 12 Moore Road                                       | NURSING HOME                |
|   |             |  | 9 North Main Street                                 | MAIN COURT HOUSE            |
|   |             |  | 4 Moore Road  | ADMINISTRATION BLDG         |

### Section 3 – Combined Heat & Power (CHP)

Combined Heat & Power (CHP) at the Crest Haven County complex was studied by Concord Engineering Group in 2003. An Executive Summary and description of the proposed project is delineated at the end of this section. The advantages at that time were energy related and improved reliability of electric power. A favorable payback to the County was shown with both scenarios analyzed. Since that study was performed additional technical, monetary and social advantages have developed that make this project even more desirable from a financial and social point of view. The recent issues that make this project more important to the County are as follows:

- The NJEMP has identified CHP as a key technology to help achieve the goals of peak load reduction, energy efficiency and reduced carbon emissions.
- The significant strain on the transmission and distribution electric grid to the County complex is even more so today. Proposed increases in power line capacity to this area are years away from being completed.
- The NJBPU has developed a CHP incentive rebate/credit that is extremely aggressive and will improve the payback of the project significantly. The incentive of \$475/kw will be paid out to the County as measured performance payments over the first five year period of operation. For a 2MW plant this equates to \$900,000 or 10% of the construction cost. It should be noted the plant could be sized for 3MW and a better payback seen which would be a 12% reduction in construction cost.
- Natural gas rates for CHP will receive a 7% reduction by elimination of the Sales & Use Tax (SUT). All public and private entities pay this tax in New Jersey. This improves the payback for the County over the life of the project.
- Investment Tax Credits (ITC's) are now available to private developers of CHP plants, as a result of new federal legislation. This provides tax paying entities a 10% of construction cost credit which can be monetized to the County.
- The NJEDA has been tasked with developing CHP plants in New Jersey. By using RGGI funds collected from the sale of carbon allowances lower tax exempt and taxable rates for financing CHP projects area available as well as other development services.
- New Demand Response Programs and capacity payments allow the County to receive additional revenue from the CHP plant.
- Technical School and Special Services School modifications required for the CHP plant have been partially completed, reducing the first cost needed for the CHP plant to operate cost effectively.

# CHP STUDY FOR CAPE MAY COUNTY

PREPARED BY CONCORD ENGINEERING GROUP, OCTOBER, 2003

## Introduction

The following report was developed by Concord Engineering Group (CEG) to evaluate the existing Crest Haven Complex and Court House Complex mechanical and electrical systems and the feasibility of installing new combined heating power plant(s) (CHP). CHP utilizes waste heat energy from electric power generation to produce thermal energy for heating and air conditioning. Efficiencies of CHP plants are higher than conventional power plants and separate heating and air conditioning systems, and consequently emit fewer emissions to produce the same energy. For a CHP plant to be economically feasible sufficient thermal load is needed to make use of the waste heat all year round. The study is intended to develop a long term plan to address on-site generation, power reliability, control of costs for transmission and distribution (T&D) of power, identification of long term commodity purchasing arrangements for electricity and natural gas, operation and maintenance of the equipment and all energy facilities. As part of the investigation we have identified available means of alternative financing for the project, and we have researched the availability of grants/rebates from Federal and State sources. The following is a summary of the scope of work performed:

1. Review and analysis of current utility demand and expense within the entire Crest Haven Campus, including tenant and other governmental users.
2. Evaluation of suitability of existing utility related infrastructure within the Crest Haven Complex for interconnection with self-generation plant.
3. Electric generation at a single site within the Crest Haven Complex and the Court House Complex, utilizing gas fired engine generator sets or combustion turbines; with distribution of power to the various buildings in the complex. Research, analyze and provide ownership and operations options for generation, as well as concept level cost estimates.
4. Distributed generation of electricity using fuel cells or micro turbines located at some or all of the buildings.
5. Investigation of possible uses of the thermal energy produced during the electric generation process.
6. Consideration of renewable energy sources such as solar, wind and landfill gas technologies.

## Executive Summary

Concord Engineering Group (CEG) performed an analysis of energy usage and generation systems at the Crest Haven Complex in Cape May County, New Jersey. The analysis was intended to determine the feasibility of onsite generation and the best combination of electrical and thermal generation sources necessary to meet the requirements of the Crest Haven Complex present and future needs.

Two alternatives were investigated and are described below:

### Alternative 1 – Central Utility Plant

The central utility plant (CUP) concept to serve the entire Crest Haven Complex will require the installation of a four-pipe network system for the distribution of hot water and chilled water, and the buyout of the existing Conectiv electrical distribution system or installation of a new system. At this stage of the evaluation it was not possible to obtain a cost from Conectiv for the buyout of their distribution system; therefore an estimate was prepared by CEG to install a new distribution system. This will provide a conservative analysis of the project. The simple payback analysis shows a simple payback of 9.2 years for the entire project including the estimated costs of the distribution systems. The life cycle analysis, which takes into consideration energy escalation cost, over a 15 year project life, shows a payback of 7.0 years. The analyses include all costs for the project, including operations and maintenance. The annual savings for this concept would be \$869,000 or 47% of total current energy cost.

### Alternative 2 – Distributed Generation

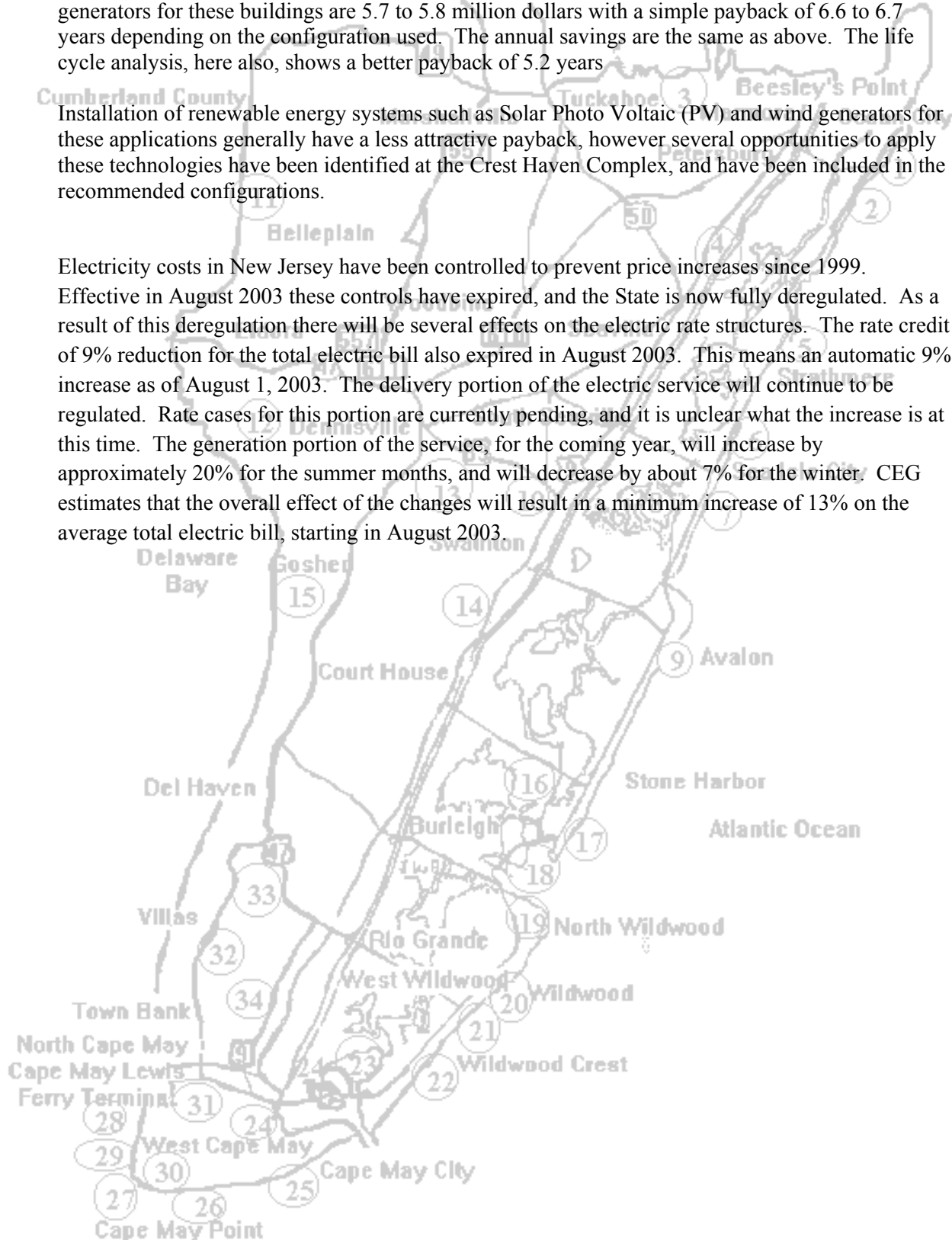
The distributed generation plant concept to serve the Crest Haven Complex would be limited to the larger buildings where there is a better balance between the electrical and the thermal energy profile. These buildings are: the Nursing Home, the Correctional Center, the Health Department, the Special Education School, the Technical School, the Administration building and the Court House Center comprised of five buildings: the main court house, the old court house, the election board, the county clerk and the library. These buildings together account for 80 % of the energy consumed for the entire complex. The total estimated cost to provide distributed cogeneration for these buildings is 4.5 to 4.6 million dollars with a simple payback of 5.4 to 5.6 years depending on the configuration used. Using a Life Cycle analysis technique the payback period would be 4.2 years. The annual savings are \$ 825,000.00 and \$ 827,000.00 respectively or 39% of total current energy costs. It should be noted that the Technical School and the Special Education School will require modifications to their HVAC systems in order to effectively benefit from a cogeneration installation. An assumption has been made that these modifications will be implemented as part of a Cape May Improvement Authority (CMIA) project, and the costs have not been included in this study.

In addition to cogeneration, it is recommend that diesel emergency generators be installed in critical buildings where power is required at all times to fully address power reliability for the Crest Haven Complex. The emergency generators will provide the additional electrical power required to meet the peak demands. The installed cost for these units is between \$300 and \$400 per kW. The emergency generators will provide backup power in case of Utility power failure. In addition, these generators can be utilized to supply peak power during periods of high demand under the PJM Emergency Load Response and the Economic Load Response Programs. Participation in these programs will require that the air quality permits for the emergency generators be modified to allow

operation in this mode. The installation cost of emergency generators will add to the overall project cost as provided above. The total estimate cost to provide distributed cogeneration and emergency generators for these buildings are 5.7 to 5.8 million dollars with a simple payback of 6.6 to 6.7 years depending on the configuration used. The annual savings are the same as above. The life cycle analysis, here also, shows a better payback of 5.2 years

Installation of renewable energy systems such as Solar Photo Voltaic (PV) and wind generators for these applications generally have a less attractive payback, however several opportunities to apply these technologies have been identified at the Crest Haven Complex, and have been included in the recommended configurations.

Electricity costs in New Jersey have been controlled to prevent price increases since 1999. Effective in August 2003 these controls have expired, and the State is now fully deregulated. As a result of this deregulation there will be several effects on the electric rate structures. The rate credit of 9% reduction for the total electric bill also expired in August 2003. This means an automatic 9% increase as of August 1, 2003. The delivery portion of the electric service will continue to be regulated. Rate cases for this portion are currently pending, and it is unclear what the increase is at this time. The generation portion of the service, for the coming year, will increase by approximately 20% for the summer months, and will decrease by about 7% for the winter. CEG estimates that the overall effect of the changes will result in a minimum increase of 13% on the average total electric bill, starting in August 2003.



## Section 4 – Wind Power Potential in Cape May County

In order to explore more deeply the County's unique advantage in New Jersey for wind power potential, a study was commissioned by Dr. Peter Janssen of Rowan University to analyze the specific potential for Cape May County. The county has exceptional offshore and shoreline potential for wind power, however the inland power potential has significant promise and up to now has been overlooked by state officials and wind developers. Based on the new farmland renewable legislation passed by the Governor's office, any wind power plants that can be developed on land dedicated to farming will receive expedited permitting and other concessions. This makes the farmland in Cape May that has sufficient wind available a prime target. This study has combined the County farmland with wind maps to provide the potential wind power that could be generated from Cape May County farmland. The results are significant in that a conservative low/high range of between 600MW and 1,100MW of wind power could be generated from Cape May County farmlands.



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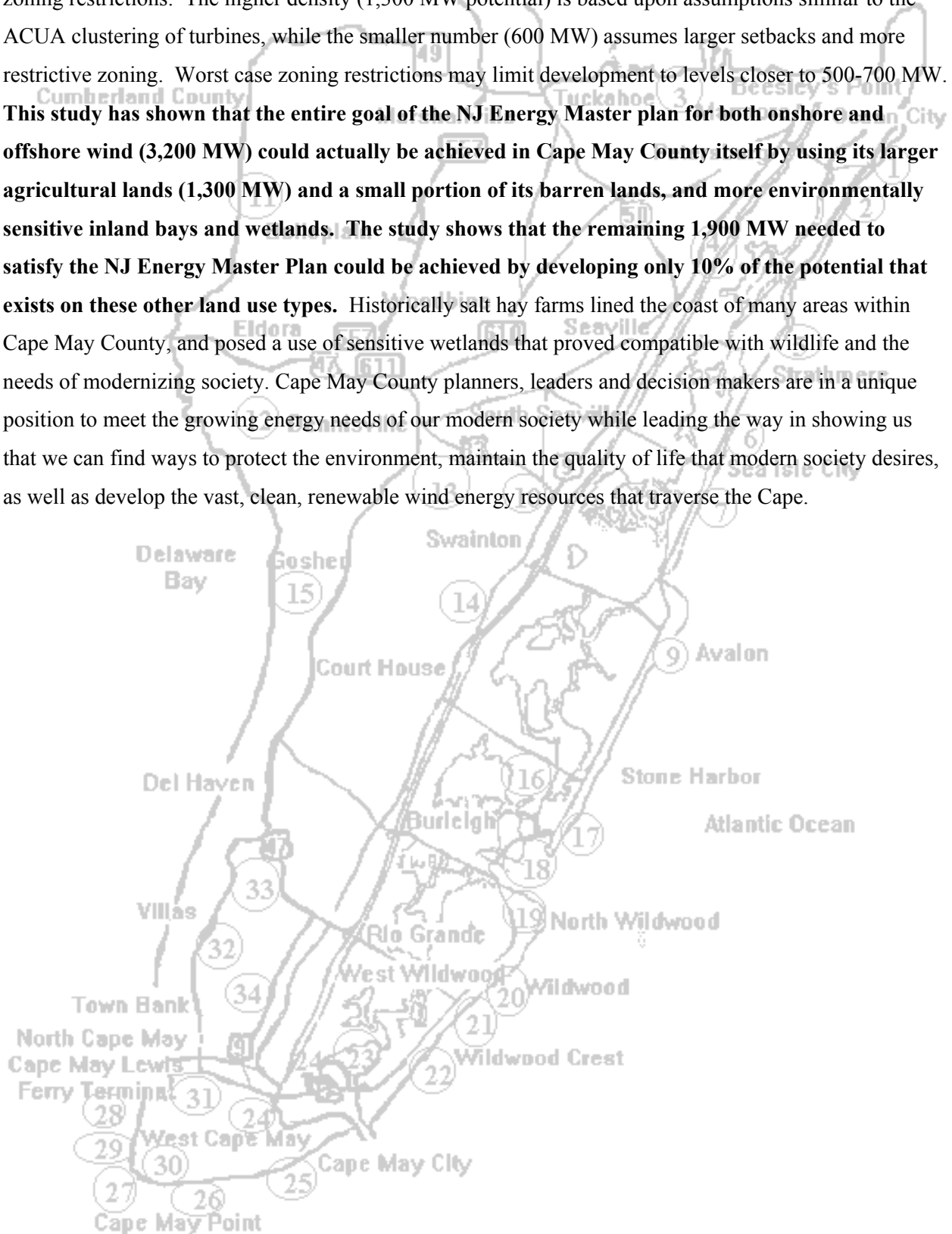
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## Executive Summary

Across the United States wind power has begun to take hold. In a recent study [Bollinger and Wisner 2007] of large electrical interconnection queues across the country, wind technology has become the largest capacity addition surpassing natural gas, coal and oil. Wind capacity additions in 2007 were 5,329 MW more than double the additions of wind during 2006 and 2005 (~2,500 MW). As a result the State of New Jersey is looking to wind to meet its growing energy needs. Of all the regions within the State of New Jersey Cape May County is uniquely positioned to play a major role in New Jersey's plans to become climate neutral during the 21<sup>st</sup> century. In the most recent version of the New Jersey Energy Master Plan [NJEMP 2008] the goals of the State to exceed its renewable portfolio standard are outlined. Specifically in the area of wind power, the Master Plan calls for the development of New Jersey's wind energy resources (p. 68) in the amounts of "at least 1,000 MW of offshore wind by the end of 2012, and at least 3,000 MW of offshore wind and up to 200 MW of onshore wind by 2020." **The study which follows indicates that Cape May County is singularly blessed by natural wind energy resources far in excess of all other counties within the State (see Figure 1). The wind resource is substantive onshore as well as offshore and the county possesses adequate agricultural lands to provide dual economies to its farmers who choose to partner with wind developers to exploit their natural resources.**

The analysis which follows indicates that Cape May County's approximately 255 square miles (~160,000 acres) of land area includes over 4% agricultural lands where wind energy harvesting and conventional farming can occur simultaneously. Of the over 6,500 acres of agricultural lands within the county over 44% of those farms lie within favorable wind regimes (> 5.5 m/s @ 50m) and are large enough (> 3 acres) to site large utility scale wind turbines. The detailed GIS work completed as part of this analysis provides clear mapping of the agricultural land uses across the county (Figure 2) as well as provides an obvious indication of what areas across the Cape May peninsula lie within the wind regimes that are favorable for resource development (Figure 3). Based upon good engineering practice at the conservative end of the analysis spectrum and economical turbine clustering similar to the development of the Jersey-Atlantic Wind Farm (located at the Atlantic City Utility Authority in Atlantic County) at the other, our team has been able to conservatively estimate the potential for wind power within Cape May County. **As we look at existing agricultural lands in tracts larger than 3 acres in favorable wind regimes within Cape May County we can conservatively estimate that between 600 MW and 1,100 MW can be economically developed.** Favorable development and land use policies could produce an additional 200 MW on farms less than 3 acres in size. The range is provided based upon uncertainty as to

facility siting limitations which may exist in each municipality within the county with respect to potential zoning restrictions. The higher density (1,300 MW potential) is based upon assumptions similar to the ACUA clustering of turbines, while the smaller number (600 MW) assumes larger setbacks and more restrictive zoning. Worst case zoning restrictions may limit development to levels closer to 500-700 MW. **This study has shown that the entire goal of the NJ Energy Master plan for both onshore and offshore wind (3,200 MW) could actually be achieved in Cape May County itself by using its larger agricultural lands (1,300 MW) and a small portion of its barren lands, and more environmentally sensitive inland bays and wetlands. The study shows that the remaining 1,900 MW needed to satisfy the NJ Energy Master Plan could be achieved by developing only 10% of the potential that exists on these other land use types.** Historically salt hay farms lined the coast of many areas within Cape May County, and posed a use of sensitive wetlands that proved compatible with wildlife and the needs of modernizing society. Cape May County planners, leaders and decision makers are in a unique position to meet the growing energy needs of our modern society while leading the way in showing us that we can find ways to protect the environment, maintain the quality of life that modern society desires, as well as develop the vast, clean, renewable wind energy resources that traverse the Cape.



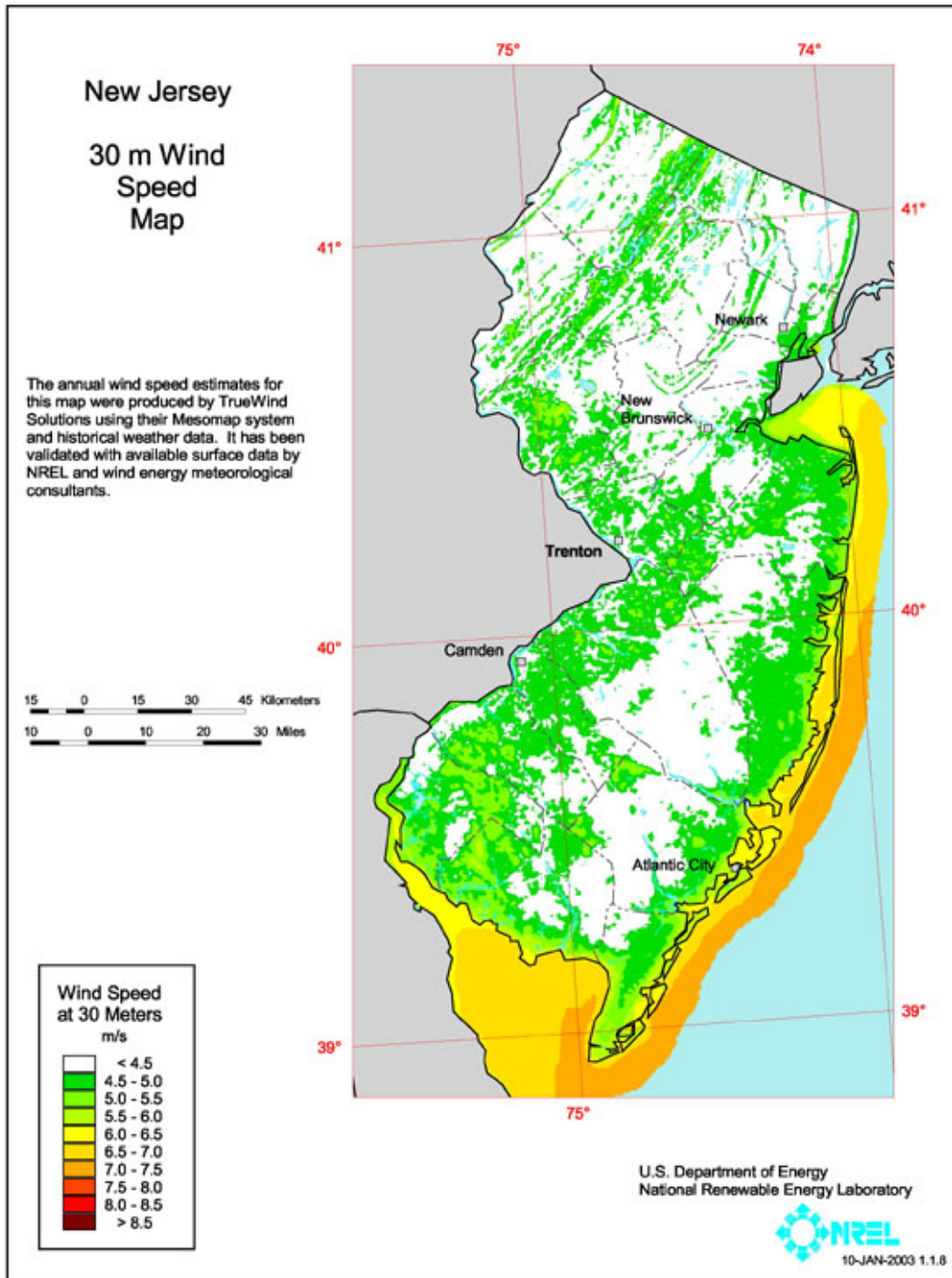


Figure 1 – NREL 30-meter Wind Map for New Jersey (2003)

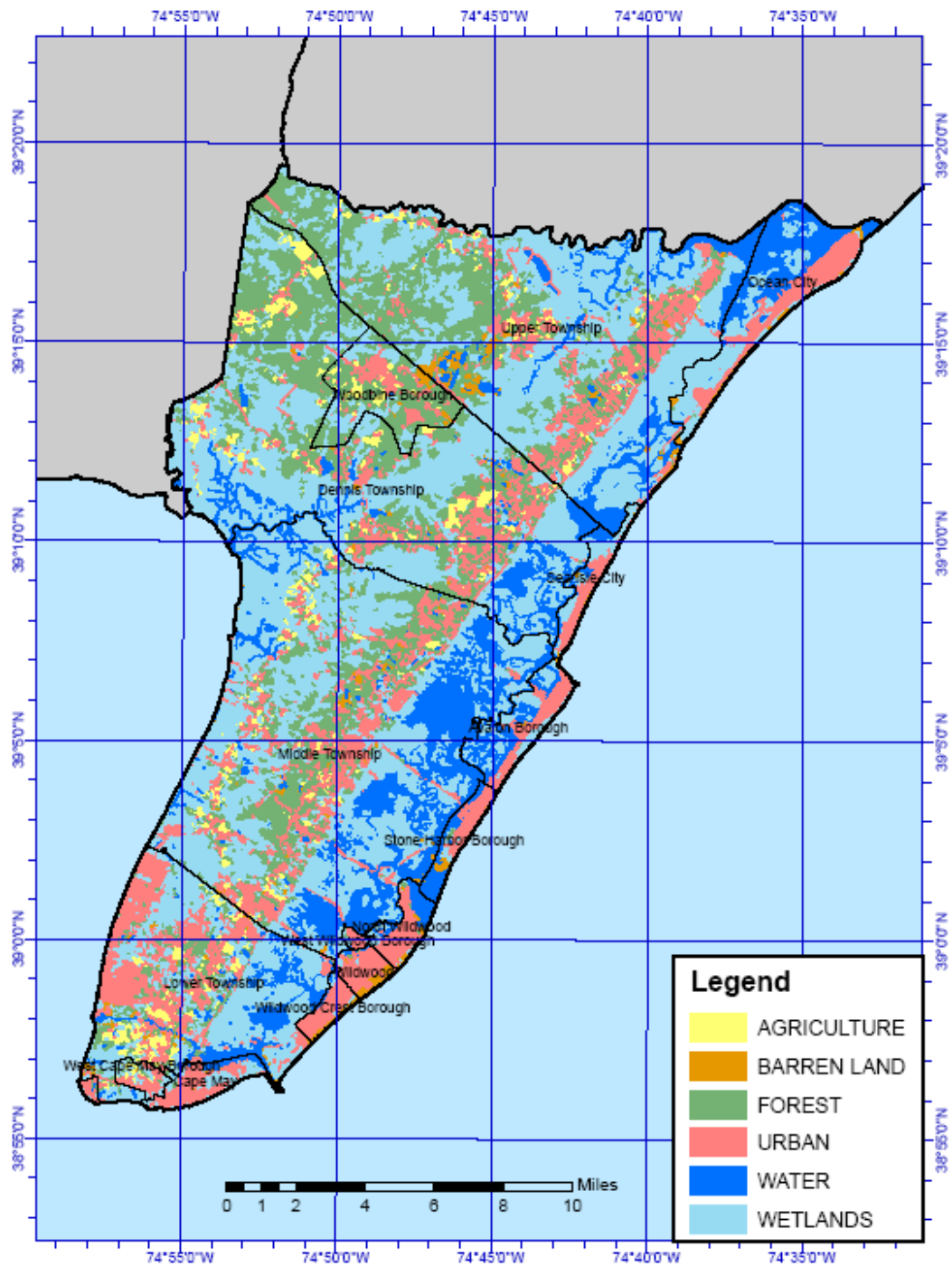


Figure 2 – GIS Land Use Layer – Cape May County, New Jersey (2002)

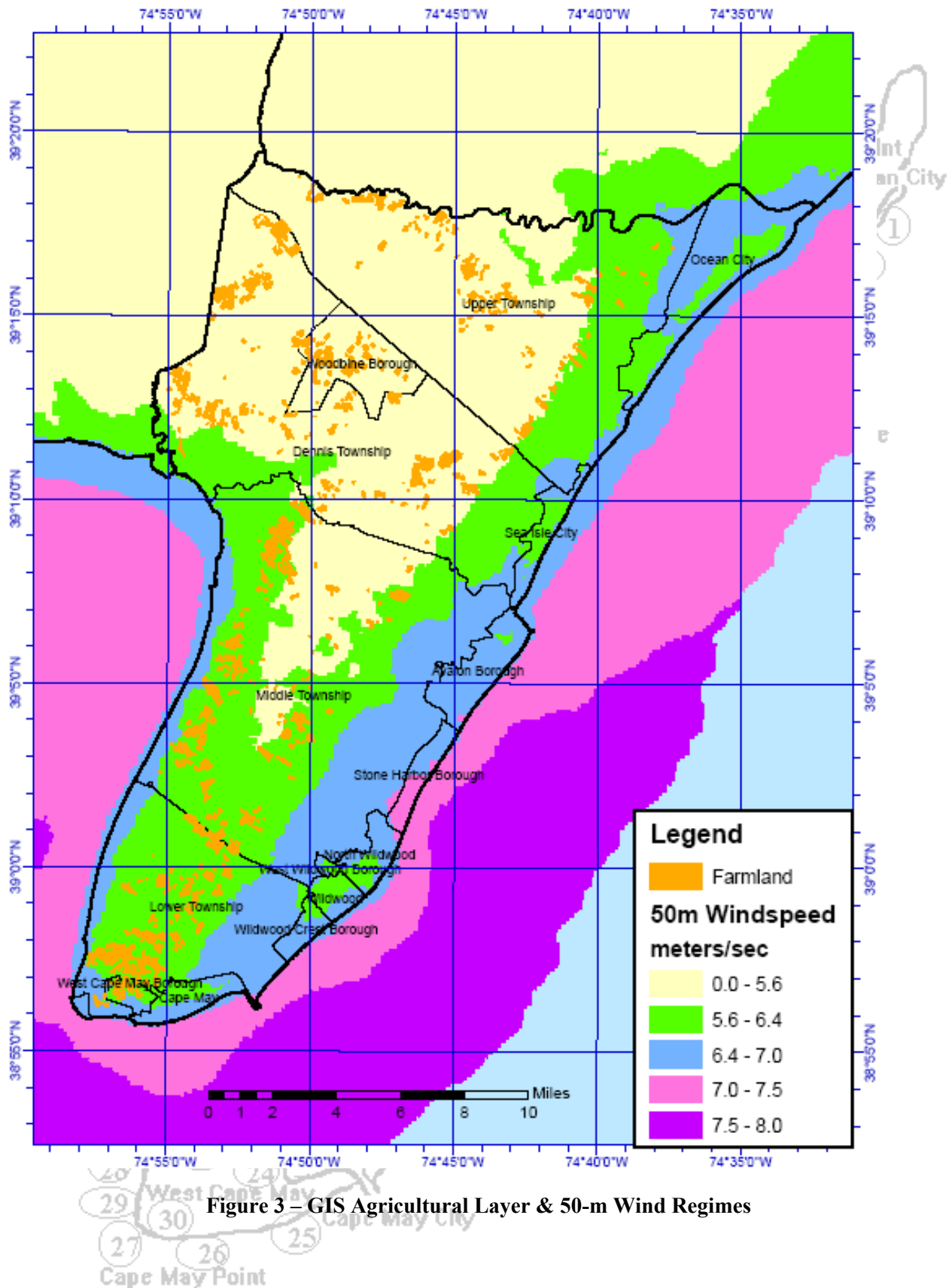


Figure 3 – GIS Agricultural Layer & 50-m Wind Regimes

## 1.0 geographical analysis

The study employed many methods for cross referencing current and older sources of geographic information in order to assure we could provide a fair estimate of the amount of resource (both land and wind) that exist within the county of Cape May to articulate an appropriate estimate of its wind power potential. These included data from the 2000 U.S. Census Bureau, the New Jersey Department of Environmental Protection's GIS data from 2002 on Land Use within the State of New Jersey as well as analyzing farmlands preserved via SADC within the county and state owned lands within the region of interest. The sections which follow summarize what was learned from each of these sources. It is clear from this geographical analysis that significant numbers of acres within the County of Cape May exist that are very suitable for wind farm development.

### 1.1 2000 Census

The census completed each decade by the U.S. Census Bureau indicates that Cape May County consisted of approximately 255.19 square miles of land area – or over 163,300 acres within its jurisdiction at the turn of the century. The population density is approximately 400 persons per square mile compared with 1,135 persons per square mile state wide. This lower overall population density is clearly more amenable to wind power development when considering onshore resources alone in what is clearly that nation's most densely populated state. The County is recognized as consisting of heavily developed barrier island communities that support a broad and diverse tourism economy. This dense development is clearly contrasted by more sparsely development densities in the County's onshore woodlands, marshlands, wetlands and farms. Overall, the peninsula that makes up the Cape is bordered by the wide expanse of the Delaware Bay to the West and the Atlantic Ocean to the East. It is dominated by flat, low elevation lands with less than one-quarter of the Cape having terrain features or trees much higher than 50-80 feet to buffet winds coming from any of the southerly, westerly or northerly directions. It is important to note at this point that throughout Europe, wind development has complemented and not competed with tourism interests as many new types of Eco-tourists flock to locations where large scale wind farming is blended into the environment in desirable tourism locations.

## 1.2 GIS Analysis / Results of Land Use 2002

The New Jersey Department of Environmental Protection provides very detailed GIS information with respect to current land use on the peninsula of Cape May which is illustrated in Figure 2 above.

Table 1 below provides a more detailed breakdown of the land use in existence during 2002, the most recent updating of the GIS information.

**Table 1 – Current (2002) Land-Use in Cape May County**

| Present Use            | Acres          | % of Total Area | % of Land |
|------------------------|----------------|-----------------|-----------|
| Agriculture            | 6,518          | 3.57%           | 4.11%     |
| Barren Land            | 2,486          | 1.36%           | 1.57%     |
| Forest                 | 36,174         | 19.81%          | 22.79%    |
| Urban Land             | 31,806         | 17.42%          | 20.04%    |
| Water                  | 23,893         | 13.08%          | N/A       |
| Wetlands*              | 81,755         | 44.76%          | 51.50%    |
| <b>Total</b>           | <b>182,632</b> | <b>100%</b>     |           |
| <b>Total Land Only</b> | <b>158,739</b> | <b>100%</b>     |           |

\*Note: Saline marsh represents ~40,000 acres or nearly half the wetland area or 23-25% of the County

The focus of this study was to determine the usability of the existing agricultural lands within the Cape May County region for potential wind harvesting in addition to existing agricultural pursuits. As has been demonstrated across the U.S. as well as in Europe, wind harvesting is an industrial process which can exist side by side with agricultural pursuits. The presence of wind farms on an agricultural farm requires only a very minor dedication of farmland to the turbines sited on the farm. In most instances the majority of the farm area can remain in cultivation while the wind resource is harvested. Wind leasing revenues provide additional income to the farmer, often making their overall profitability increase. The photograph below in Figure 4 illustrates the dual benefits of wind farming to farmers. This picture is from a cornfield in Minnesota.

Cumberland



**Figure 4 – Wind Turbines in Southern Minnesota Cornfield**

PHOTO Courtesy of Scott Mayerowitz/ABC

With current wind technology it is possible to use many of the current lands in Cape May County for wind farming. It is clear that all lands currently barren or agricultural in use may be potential sites, but further the existing bays and marshes are potential sites for generation as well. Wind turbines are a very low density development, requiring a minimal ecological footprint and very little land disturbance in addition to the placement of the turbine foundation (typically smaller than ¼ acre disturbance) and the underground electrical connections from the turbine to the customer site or utility distribution feeder. Based upon the GIS analysis summarized in Table 1 above the County of Cape May actually has a potential to deploy wind turbines over nearly 75% of the available land – this estimate only restricts existing developed urban lands and existing forests from the potential. The report and analysis completed herein, however, primarily assesses the farmland for the County which is limited to 3.5-4% of the available land area.

### 1.3 Available Farmland

As shown in Table 1 the existing farmlands represent over 6,000 acres of potentially developable wind farms. This section of our report and analysis reviews the farmland on a parcel by parcel basis as provided in GIS. It is important to note that these parcels are contiguous land blocks but not necessarily parcels of property with a single owner. The work completed herein for the farmland for the County is

limited to those parcels able to deploy larger, utility scale turbines (> 1 MW in size) that will be described in a later section. As a result we have looked at existing agricultural parcels larger than 3 acres in size. Smaller wind turbines can be placed on parcels smaller than these but will represent a significantly smaller part of the County’s overall potential wind development potential. Extraction of agricultural parcels for Cape May County yielded the following summary results – highlighted in Table 2.

**Table 2 – Agricultural Parcel Size in Cape May County**

| <b>Parcel Size</b> | <b>Acres</b> | <b>Average Size (Acres)</b> | <b>Total #</b> |
|--------------------|--------------|-----------------------------|----------------|
| 0 - 3 acres        | 806          | 1.2 acres/parcel            | 670            |
| > 3 acres          | 5,714        | 14.3 acres/parcel           | 399            |
| > 5 acres          | 5,210        | 19.4 acres/parcel           | 269            |
| > 10 acres         | 4,395        | 29.3 acres/parcel           | 150            |
| All parcels        | 6,520        | 6.1 acres/parcel            | 1,059          |

While the data indicates that the County includes over 6,500 acres of land currently in agricultural use, it also shows that they are comprised of over 1,000 parcels. As our analysis refined the parcel groupings to those greater than 3 acres in size – the minimum size of interest to the study – we have found that we retain nearly 80% of the county’s farmland in the new grouping but reduce the number of parcels of interest to below 400 (less than 38% of the original total). This makes a site by site analysis more effectively completed. The final section of the geographic analysis develops a listing of the nearly 400 parcels (detailed in Appendix A) for analysis of suitability for wind farming.

#### 1.4 Summary of GIS Results

The GIS data and supporting analysis indicates that the county includes over 5,700 acres of land currently in agricultural use which may be very suitable for industrial scale wind development (i.e., parcel size greater than 3 acres). The detail provided in the next section will indicate that a smaller portion of this land lies in a geographic location more suitable for wind. We have overlaid a new GIS layer for our analysis which consisted of the average wind speed at 50 meter height [NREL 2003] above the topography. When this layer is included the amount of available farmland considered with a very high potential for wind development (i.e., wind speeds aloft of greater than 5.5 m/s on average annually) drops significantly. The GIS analysis herein ends by summarizing that the County of Cape May includes over 2,650 acres of agricultural land in favorable wind regime (> 5.5 m/s @ 50 meter elevation) distributed in 152 parcels that are over 3 acres in size.

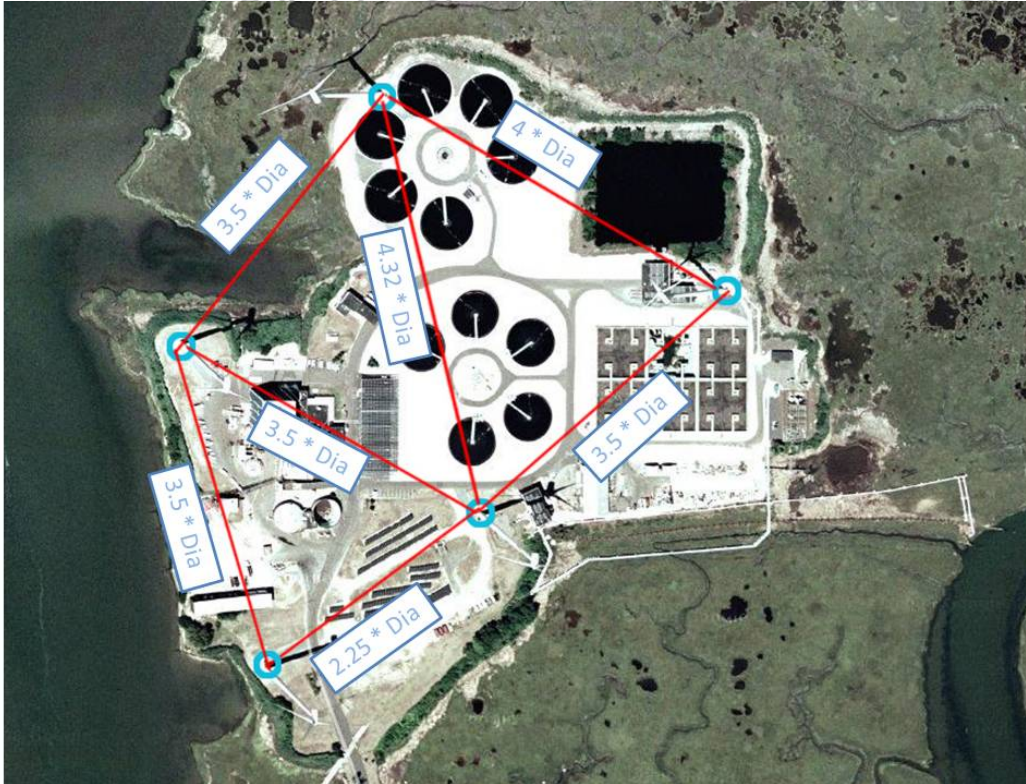
## 2.0 Wind technology siting

### 2.1 Best Practices

The siting of wind turbines and wind farms is becoming a well developed discipline now that these generating technologies have become so widespread across the developed nations. Their particular placement on any specific piece of property is often restricted by local zoning ordinance requirements and property setbacks as in any other type of new development – but for large scale wind turbines the spacing between the turbines to minimize the disturbance these units can cause one another due to affecting the wind front typically dominates the overall placement and siting decisions. If we were to attempt to place multiple turbines on a single piece of property we would want to assure a reasonable spacing between them horizontally (typically in multiples of blade diameter) as the group faces perpendicular to the primary wind directions (determined from the wind rose of the meteorological data for the region). In addition, a larger spacing between rows (again many multiples of blade diameters) is part of a best practice engineering design for a wind farm when optimal production from the wind (per machine) is desired. It is always possible to trade-off individual turbine performance for gaining more production from a given site overall, but unless the wind regime is very favorable it is often not cost-effective to cluster the turbines too closely to each other given that the production decreases resulting from wake and turbulence effects introduced to the wind across the wind farm. The National Renewable Energy Laboratory recommends spacing of 5-10 rotor diameters between turbines when placing them on a wind farm [NREL 2008]. Obviously properties smaller than 3 acres can easily handle a 1-2MW turbine which only has a foot print of less than ¼ acre, but other siting issues come into play. These issues are dominated by setbacks from potential wind obstructions (forests, tall buildings, communities, etc.), fall zones that may be required from a public safety perspective as well as the zoning requirements that may exist in the municipality where the turbine is to be sited. Aggressive public policy can go a long way to open the access of desirable wind farm land to potential developers by streamlining the requirements that will exist for farm parcels that have could be potentially good sites for wind farms. While high densities of turbines on desirable parcels is to be encouraged, the upper end on density will be restricted by inter-turbine spacing issues that would otherwise lead to poor farm performance if not managed.

## 2.2 ACUA Approach

The siting of wind turbines at the Atlantic County Utility Authority site in Atlantic City, New Jersey is an excellent example of clustering. As can be seen in Figure 5 below, the turbines do not meet the 5-10 blade diameter spacing recommended by the US Department of Energy. This particular placement example shows clustering to take advantage of a smaller parcel of land.



**Figure 5 – Wind Turbine Siting at ACUA in Atlantic City**

In the Jersey-Atlantic wind farm we can observe the placement of five (5) 1.5 MW GE turbines in the space of 25 acres of land. This density of 5 acres per turbine is still good engineering practice. In a best configuration scenario we might expect a density of 1 turbine per 3 acres if the configuration and prevailing wind location was favorable. However, if we include fall zones or setbacks we can find that this number can grow to as high as 14 acres per turbine in a smaller or geographically constrained wind farm setting.

### 2.3 Overall Siting Assumptions

In order for this first look at wind farm potential in Cape May County to be both conservative and true to the uncertainties - we have considered the entire range of turbine spacing from the most efficient utilization of winds typically from one or two dominant directions, as experienced in Altamont Pass in California (3 acres per turbine) to a worst case scenario where fall zones and excessive zoning restrictions limit development to very low densities (14 acres per turbine). The likely scenario is an assumption of 7 acres per turbine which is more restrictive than the clustering at ACUA but will provide us with an estimate that we can be confident is conservative. Table 3 below provides a clear assessment of the assumptions used in this study and shows the placement of the ACUA system for reference in the range of considered possibilities.

**Table 3 – Wind Turbine Siting Assumptions for Cape May County**

| Density       | Acres per turbine | Characteristics Leading to Assumption      |
|---------------|-------------------|--|
| Best Case     | 3                 | Excellent parcel orientation and winds     |
| ACUA          | 5                 | Comparable density to Jersey-Atlantic Farm |
| Expected Case | 7                 | Conservative farm spacing & setbacks       |
| Worst Case    | 14                | Excessive regulation and fall zones        |

The siting of wind turbines at the density levels assumed above produces a significant range of alternative renewable energy futures for Cape May County.

### 3.0 Potential for large scale wind farms in the county

#### 3.1 Agricultural Land Based ONLY

The siting of wind turbines on the agricultural lands identified in Section 1 above portend a very large range of potential wind penetration in the County. If we consider the 2,650 acres of agricultural land that lies within a very favorable wind regime ( $> 5.5 \text{ m/s}$  @ 50 meter elevation) we have identified 152 parcels that meet our requirement of being over 3 acres in size. If we assume a minimum single turbine at the smallest of these sites and use the turbine densities identified in Table 3 we arrive at the range of potential turbines and MW of installed wind capacity shown in Table 4 below:

**Table 4 – Wind Turbines and Wind Capacity for Cape May County**

| Density (Acre/unit) | # of turbines | Capacity of Turbines for CMC |                |
|---------------------|---------------|------------------------------|----------------|
|                     |               | 1.5MW – GE                   | 2.0MW - Gamesa |
| 3 acres             | 876           | 1,314 MW                     | 1,762 MW       |
| 5 acres (ACUA)      | 530           | 795 MW                       | 1,060 MW       |
| 7 acres             | 395           | 593 MW                       | 790 MW         |
| 14 acres            | 244           | 366 MW                       | 488 MW         |

We have selected two different types of industrial scale wind turbines for the completion of this study – the GE 1.5 MW and Gamesa 2MW machines. These machines are large enough to efficiently extract a large portion of the wind energy where they are sited and provide economies of scale and farm placement that smaller machines can not match. Were the study to have considered medium or small scale wind technologies (10, 25 50, 100 kW, etc.) the findings would be much lower wind capacity. While many more turbines could have been placed on the Cape, the cost effectiveness of sizing many small machines is much lower and would not yield as economic power costs.

The higher capacity number presented in Table 4 has a higher probability of occurrence than the extremely low number based upon the strong public policy support, economic incentives and regulatory environment within the State of New Jersey at present. However, should the County or municipalities within Cape May County elect to not support wind development that event could change the balance and provide a more hostile regulatory framework locally leading to the excessive regulation and large required fall zones that could make the lower density scenario a more likely reality. It should be noted that an additional 100-200 turbines (representing 150-300 additional MW of capacity) can feasibly be located on many of the 600-700 parcels less than 3 acres within the County should the environment for development be positive. Countries like Denmark have adopted strong public policy guidelines to specifically include all small farmers in their wind market. In that country over 20% of their energy is now provided by wind energy, their goal for 2025 is to achieve 50% of their national demand which will come mostly from offshore development.

It is a conservative finding of this study that easily 800-1000 MW of wind could be provided from existing larger farmland within the County. With aggressive siting this number could rise to 1,300 on those 150+ parcels and if the additional 650+ parcels of smaller size are enabled to participate in this market then another 200-300MW potential could be realized. Larger turbines (2.0 MW Gamesa turbines) could also be sited in place of the 1.5 MW (GE) units assumed to achieve land based penetrations approaching 2,000 MW.

### 3.2 Salt Hay Farms, Bays and Other Lands in the County

The siting of wind turbines across the county has been limited in this study by looking only at existing agricultural lands. Other land types that are usable within the County include barren land, inland bays, wetlands, etc. It is understood that the development of environmentally sensitive areas would need to be undertaken with great care and with best practices. It is noted from research conducted for this study that it is in fact possible to generate funds for the preservation of such sensitive lands by using them in this low density manner. Just as most types of agricultural activities are very compatible with wind farming, so too are all types of environmental preservation and aquatic farming activities. While it is beyond the scope of this wind capacity study to detail how such lands can be both preserved and developed by wind farms, it is useful to present the facts that it has been done and is increasingly being done increasingly around the world.

As a closing chapter to this study we have provided a simplistic analysis that can be helpful for policy making by the planning boards of Cape May County and local municipalities to determine what land types they would like to include as they pursue potential wind development. Because these lands may be more environmentally sensitive this assessment has assumed only the minimum densities (7-14 acres per turbine) of wind machine development. The table below summarizes the available lands – makes a similar assumption as to how much of that land lies in potentially good wind regimes (47%) based upon our findings for agricultural lands within the County, and estimates maximum and minimum wind power density levels for each land type. Table 5 reveals a significant range of alternative wind futures for these land types in Cape May County.

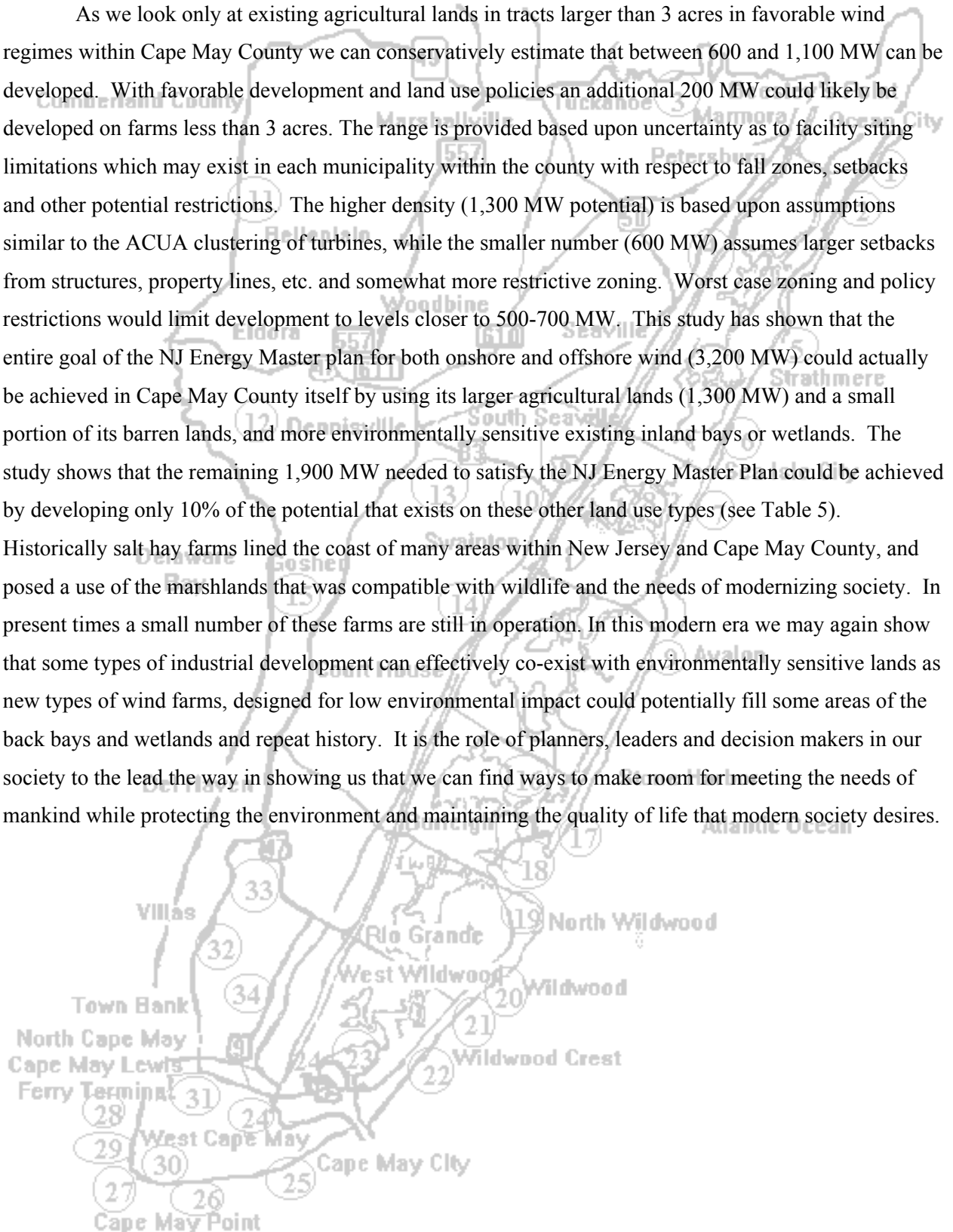
**Table 5 – Wind Capacity for Other Land Use Types in Cape May County**

| Land Use Type       | Acres         | Capacity of Turbines for CMC |                    |
|---------------------|---------------|------------------------------|--------------------|
|                     |               | @ 14 acres (GE)              | @.7 acres (Gamesa) |
| Barren Land         | 1,173         | 126 MW                       | 335 MW             |
| Marshlands (Fresh)  | 19,708        | 2,212 MW                     | 5,631 MW           |
| Slat Hay Farms      | 18,880        | 2,203 MW                     | 5,394 MW           |
| <u>Inland Bays*</u> | <u>23,893</u> | <u>2,560 MW</u>              | <u>6,827 MW</u>    |
| <b>TOTAL</b>        | <b>63,654</b> | <b>7,101 MW</b>              | <b>18,187 MW</b>   |

\* - 100% of the inland bay areas lie in wind regimes higher than 5.5 m/s @ 50 meters

### 3.3 Summary of CMC Wind Potential

As we look only at existing agricultural lands in tracts larger than 3 acres in favorable wind regimes within Cape May County we can conservatively estimate that between 600 and 1,100 MW can be developed. With favorable development and land use policies an additional 200 MW could likely be developed on farms less than 3 acres. The range is provided based upon uncertainty as to facility siting limitations which may exist in each municipality within the county with respect to fall zones, setbacks and other potential restrictions. The higher density (1,300 MW potential) is based upon assumptions similar to the ACUA clustering of turbines, while the smaller number (600 MW) assumes larger setbacks from structures, property lines, etc. and somewhat more restrictive zoning. Worst case zoning and policy restrictions would limit development to levels closer to 500-700 MW. This study has shown that the entire goal of the NJ Energy Master plan for both onshore and offshore wind (3,200 MW) could actually be achieved in Cape May County itself by using its larger agricultural lands (1,300 MW) and a small portion of its barren lands, and more environmentally sensitive existing inland bays or wetlands. The study shows that the remaining 1,900 MW needed to satisfy the NJ Energy Master Plan could be achieved by developing only 10% of the potential that exists on these other land use types (see Table 5). Historically salt hay farms lined the coast of many areas within New Jersey and Cape May County, and posed a use of the marshlands that was compatible with wildlife and the needs of modernizing society. In present times a small number of these farms are still in operation. In this modern era we may again show that some types of industrial development can effectively co-exist with environmentally sensitive lands as new types of wind farms, designed for low environmental impact could potentially fill some areas of the back bays and wetlands and repeat history. It is the role of planners, leaders and decision makers in our society to the lead the way in showing us that we can find ways to make room for meeting the needs of mankind while protecting the environment and maintaining the quality of life that modern society desires.



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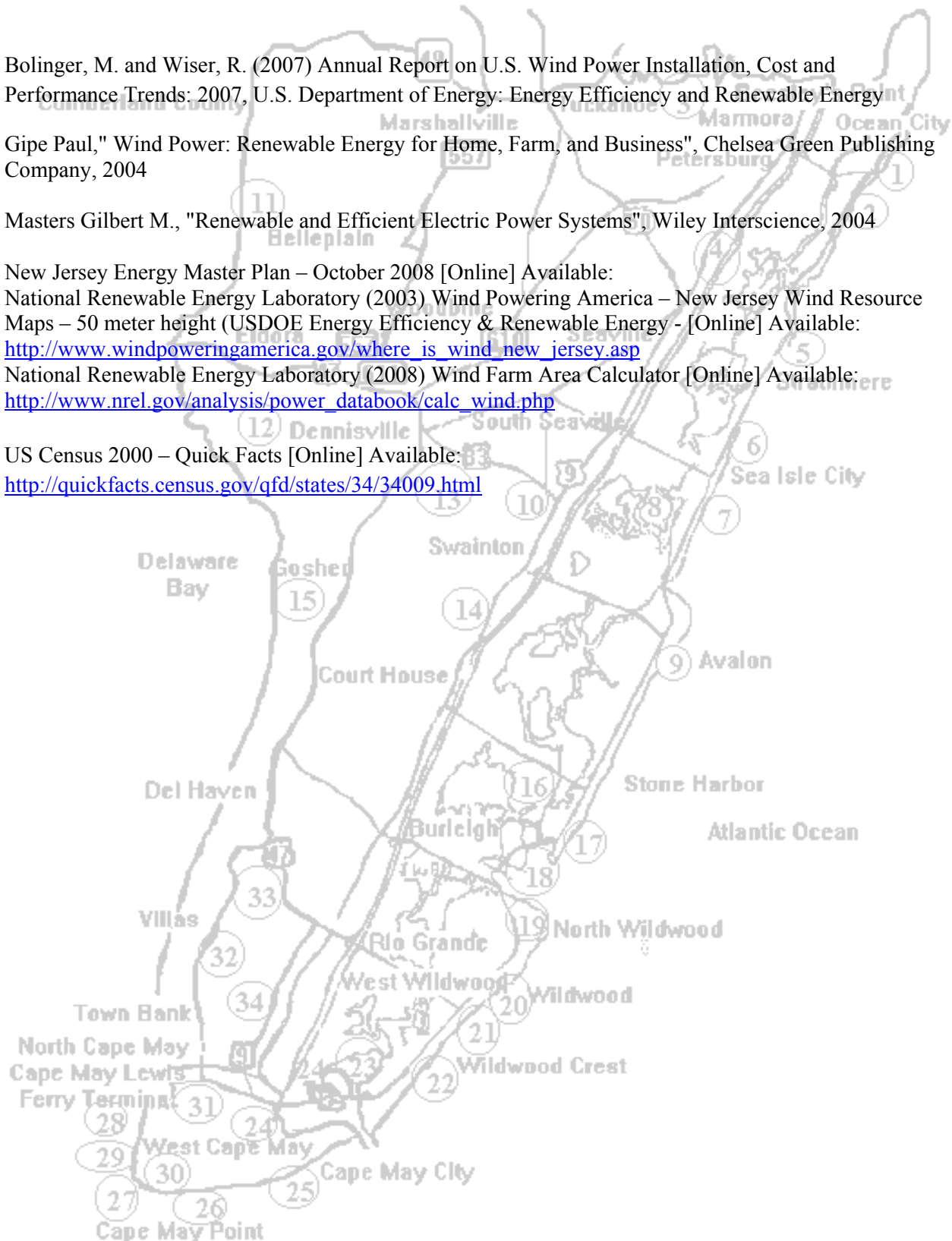
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| TYPE02      | acres  | latitude | longitude | 50m_windsp | 30m_windsp |
|-------------|--------|----------|-----------|------------|------------|
| AGRICULTURE | 3.99   | 38.93760 | -74.95140 | 6.4 - 7.0  | 6.0 - 6.5  |
| AGRICULTURE | 12.15  | 38.93870 | -74.95640 | 6.4 - 7.0  | 6.0 - 6.5  |
| AGRICULTURE | 6.72   | 38.94160 | -74.95240 | 6.4 - 7.0  | 6.0 - 6.5  |
| AGRICULTURE | 15.15  | 38.94290 | -74.93300 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 40.79  | 38.94270 | -74.94350 | 6.4 - 7.0  | 6.0 - 6.5  |
| AGRICULTURE | 7.05   | 38.94610 | -74.93860 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 3.83   | 38.94700 | -74.94100 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 3.05   | 38.94760 | -74.93420 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 12.32  | 38.94750 | -74.94490 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 10.39  | 38.94790 | -74.92820 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 5.28   | 38.94990 | -74.93320 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 17.12  | 38.94950 | -74.94010 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 6.13   | 38.95210 | -74.93130 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 14.66  | 38.95300 | -74.92860 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 17.21  | 38.95310 | -74.93950 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 13.09  | 38.95330 | -74.93520 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 54.59  | 38.95140 | -74.92130 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 6.49   | 38.95510 | -74.92320 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 25.99  | 38.95410 | -74.94560 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 9.93   | 38.95600 | -74.94020 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 6.89   | 38.95670 | -74.96150 | 6.4 - 7.0  | 6.0 - 6.5  |
| AGRICULTURE | 3.24   | 38.95890 | -74.93370 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 4.73   | 38.95850 | -74.95250 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 77.06  | 38.95750 | -74.92790 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 6.02   | 38.95980 | -74.96060 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 11.73  | 38.95950 | -74.95900 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 16.26  | 38.95960 | -74.95530 | 5.6 - 6.4  | 5.5 - 6.0  |
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| AGRICULTURE | 4.86   | 38.96630 | -74.90770 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 21.26  | 38.96820 | -74.91110 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 14.86  | 38.96910 | -74.91900 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 3.93   | 38.97000 | -74.91290 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 10.86  | 38.97030 | -74.93850 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 91.15  | 38.96900 | -74.92840 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 5.56   | 38.97380 | -74.92300 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 25.40  | 38.97250 | -74.89750 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 5.12   | 38.97620 | -74.90060 | 5.6 - 6.4  | 5.5 - 6.0  |

| TYPE02      | acres | latitude | longitude | 50m_windsp | 30m_windsp |
|-------------|-------|----------|-----------|------------|------------|
| AGRICULTURE | 12.88 | 38.97670 | -74.92480 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 7.58  | 38.97760 | -74.91040 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 4.92  | 38.98120 | -74.90990 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 21.39 | 38.98050 | -74.90340 | 5.6 - 6.4  | 5.5 - 6.0  |
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| AGRICULTURE | 4.18  | 38.98830 | -74.89990 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 3.07  | 38.98860 | -74.91730 | 5.6 - 6.4  | 5.5 - 6.0  |
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| AGRICULTURE | 21.20 | 38.99090 | -74.93960 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 4.95  | 38.99300 | -74.90210 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 4.60  | 38.99380 | -74.93240 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 70.08 | 38.99360 | -74.91860 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 4.01  | 38.99620 | -74.89960 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 38.10 | 38.99630 | -74.89210 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 3.19  | 38.99960 | -74.88920 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 8.05  | 38.99920 | -74.91380 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 41.35 | 38.99800 | -74.88160 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 7.54  | 39.00430 | -74.88230 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 7.40  | 39.00770 | -74.87630 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 17.06 | 39.00900 | -74.88610 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 34.39 | 39.00910 | -74.87800 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 84.35 | 39.01290 | -74.88830 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 27.15 | 39.01620 | -74.89750 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 11.76 | 39.01830 | -74.86540 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 10.38 | 39.02010 | -74.88370 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 3.54  | 39.02140 | -74.86430 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 6.50  | 39.02130 | -74.86780 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 6.86  | 39.02280 | -74.89220 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 21.92 | 39.02160 | -74.87200 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 45.59 | 39.02140 | -74.90200 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 6.50  | 39.02310 | -74.88830 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 6.45  | 39.02400 | -74.86980 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 3.92  | 39.02570 | -74.86520 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 8.55  | 39.02540 | -74.87200 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 4.20  | 39.02680 | -74.86300 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 16.22 | 39.03170 | -74.89360 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 35.86 | 39.03710 | -74.89430 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 6.02  | 39.03940 | -74.89030 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 5.16  | 39.04080 | -74.84460 | 5.6 - 6.4  | 5.5 - 6.0  |

| TYPE02      | acres  | latitude | longitude | 50m_windsp | 30m_windsp |           |
|-------------|--------|----------|-----------|------------|------------|-----------|
| AGRICULTURE | 7.45   | 7.45     | 39.04440  | -74.89880  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 29.37  | 29.37    | 39.04740  | -74.90730  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 39.29  | 39.29    | 39.04640  | -74.89410  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 15.42  | 15.42    | 39.04810  | -74.84820  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 5.51   | 5.51     | 39.04980  | -74.85710  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 19.65  | 19.65    | 39.05170  | -74.85920  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 11.76  |          | 39.05360  | -74.86250  | 0 - 5.6    | 4.5 - 5.0 |
| AGRICULTURE | 9.43   | 9.43     | 39.05410  | -74.89820  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 7.74   | 7.74     | 39.05520  | -74.84420  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 4.07   | 4.07     | 39.05570  | -74.91350  | 6.4 - 7.0  | 6.0 - 6.5 |
| AGRICULTURE | 74.75  | 74.75    | 39.05370  | -74.90740  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 3.41   | 3.41     | 39.05630  | -74.89790  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 16.79  | 16.79    | 39.05860  | -74.83350  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 5.22   |          | 39.05980  | -74.84950  | 0 - 5.6    | 4.5 - 5.0 |
| AGRICULTURE | 31.07  |          | 39.06100  | -74.84710  | 0 - 5.6    | 4.5 - 5.0 |
| AGRICULTURE | 3.15   | 3.15     | 39.06310  | -74.84000  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 109.47 | 109.47   | 39.06110  | -74.89920  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 3.96   |          | 39.06560  | -74.85190  | 0 - 5.6    | 4.5 - 5.0 |
| AGRICULTURE | 5.58   | 5.58     | 39.06570  | -74.90440  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 4.69   |          | 39.06610  | -74.84830  | 0 - 5.6    | 4.5 - 5.0 |
| AGRICULTURE | 11.46  | 11.46    | 39.06670  | -74.83650  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 15.83  | 15.83    | 39.06660  | -74.89020  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 6.27   | 6.27     | 39.06800  | -74.83830  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 4.41   |          | 39.06910  | -74.85050  | 0 - 5.6    | 4.5 - 5.0 |
| AGRICULTURE | 29.76  | 29.76    | 39.06790  | -74.84190  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 22.35  | 22.35    | 39.06910  | -74.89440  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 3.48   | 3.48     | 39.07070  | -74.82340  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 7.45   | 7.45     | 39.07130  | -74.82220  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 8.07   | 8.07     | 39.07120  | -74.86830  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 12.10  | 12.10    | 39.07160  | -74.89300  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 3.68   | 3.68     | 39.07900  | -74.88970  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 4.74   | 4.74     | 39.07960  | -74.87730  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 6.24   | 6.24     | 39.08130  | -74.84360  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 9.56   | 9.56     | 39.08310  | -74.89470  | 6.4 - 7.0  | 6.0 - 6.5 |
| AGRICULTURE | 49.80  | 49.80    | 39.07970  | -74.88980  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 3.52   | 3.52     | 39.08590  | -74.87830  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 7.74   | 7.74     | 39.08540  | -74.89510  | 6.4 - 7.0  | 6.0 - 6.5 |
| AGRICULTURE | 9.22   | 9.22     | 39.08790  | -74.87740  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 4.11   |          | 39.08840  | -74.83330  | 0 - 5.6    | 4.5 - 5.0 |
| AGRICULTURE | 7.33   | 7.33     | 39.08950  | -74.87360  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 3.55   | 3.55     | 39.09000  | -74.88700  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 7.49   | 7.49     | 39.09080  | -74.88190  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 4.48   | 4.48     | 39.09440  | -74.88460  | 5.6 - 6.4  | 5.5 - 6.0 |
| AGRICULTURE | 30.06  | 30.06    | 39.09230  | -74.87690  | 5.6 - 6.4  | 5.5 - 6.0 |

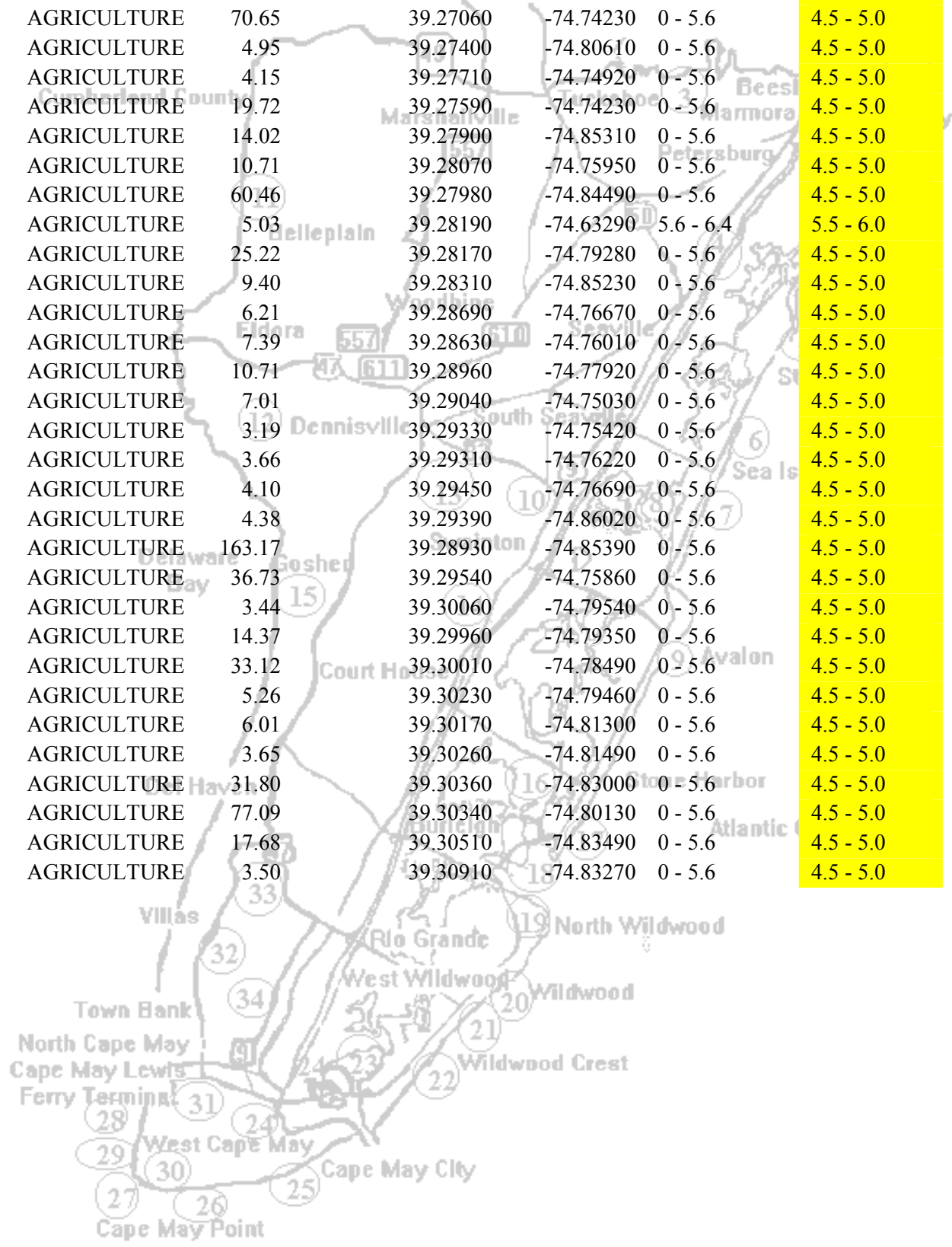
| TYPE02      | acres  |        | latitude | longitude | 50m_windsp | 30m_windsp |
|-------------|--------|--------|----------|-----------|------------|------------|
| AGRICULTURE | 9.43   | 9.43   | 39.09510 | -74.87920 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 3.25   | 3.25   | 39.09570 | -74.88250 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 3.23   |        | 39.10040 | -74.81890 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 19.65  | 19.65  | 39.10130 | -74.87620 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 24.92  | 24.92  | 39.10100 | -74.88070 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 7.95   |        | 39.10490 | -74.82300 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 8.52   | 8.52   | 39.10460 | -74.87590 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 4.11   | 4.11   | 39.10910 | -74.87610 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 5.16   | 5.16   | 39.10940 | -74.87340 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 17.04  |        | 39.11080 | -74.79890 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 6.39   | 6.39   | 39.11470 | -74.87360 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 8.06   |        | 39.12280 | -74.84330 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 79.08  | 79.08  | 39.12360 | -74.78190 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 15.09  | 15.09  | 39.12610 | -74.86240 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 27.54  |        | 39.12620 | -74.82030 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 5.98   |        | 39.12710 | -74.82360 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 3.56   | 3.56   | 39.12780 | -74.85680 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 11.22  |        | 39.12990 | -74.84560 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 12.92  | 12.92  | 39.13090 | -74.86080 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 19.73  |        | 39.13340 | -74.84480 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 3.47   | 3.47   | 39.13350 | -74.84890 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 3.00   |        | 39.13470 | -74.77720 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 4.55   | 4.55   | 39.13490 | -74.85090 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 8.52   |        | 39.13620 | -74.77610 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 7.77   | 7.77   | 39.13610 | -74.84660 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 3.88   |        | 39.13710 | -74.83070 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 4.54   | 4.54   | 39.13740 | -74.85680 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 3.47   |        | 39.13990 | -74.84690 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 28.23  | 28.23  | 39.14130 | -74.86020 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 3.94   |        | 39.14380 | -74.84780 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 6.48   | 6.48   | 39.14400 | -74.85210 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 5.83   | 5.83   | 39.14620 | -74.85900 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 4.42   | 4.42   | 39.14680 | -74.85030 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 3.53   |        | 39.14780 | -74.76590 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 63.29  | 63.29  | 39.14460 | -74.85640 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 7.01   |        | 39.14750 | -74.84930 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 6.35   |        | 39.14900 | -74.84570 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 6.74   | 6.74   | 39.14900 | -74.85450 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 15.40  | 15.40  | 39.15220 | -74.85620 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 3.70   | 3.70   | 39.15320 | -74.84460 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 24.10  |        | 39.15360 | -74.75360 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 18.52  |        | 39.15740 | -74.83380 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 131.30 | 131.30 | 39.15380 | -74.84920 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 21.20  |        | 39.16280 | -74.82690 | 0 - 5.6    | 4.5 - 5.0  |

| TYPE02      | acres  | latitude | longitude | 50m_windsp | 30m_windsp |
|-------------|--------|----------|-----------|------------|------------|
| AGRICULTURE | 56.48  | 39.16210 | -74.83800 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 8.71   | 39.16500 | -74.77960 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 8.94   | 39.16440 | -74.76770 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 14.78  | 39.16480 | -74.84320 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 11.71  | 39.16770 | -74.76630 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 4.82   | 39.16840 | -74.79630 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 9.92   | 39.16940 | -74.80300 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 16.70  | 39.16950 | -74.79350 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 4.15   | 39.17130 | -74.74470 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 4.21   | 39.17140 | -74.81880 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 4.34   | 39.17300 | -74.82150 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 50.43  | 39.17230 | -74.74060 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 27.84  | 39.17360 | -74.82510 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 5.12   | 39.17500 | -74.81680 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 23.94  | 39.17760 | -74.74810 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 12.54  | 39.17890 | -74.73430 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 198.37 | 39.18040 | -74.76980 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 10.53  | 39.18640 | -74.72700 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 13.19  | 39.18640 | -74.72110 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 5.64   | 39.18820 | -74.71920 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 143.63 | 39.18550 | -74.75330 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 3.88   | 39.18850 | -74.72340 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 5.93   | 39.18870 | -74.85180 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 4.52   | 39.18910 | -74.71870 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 8.62   | 39.19070 | -74.90970 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 4.11   | 39.19520 | -74.83660 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 19.88  | 39.19600 | -74.84690 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 7.96   | 39.19800 | -74.82200 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 3.03   | 39.19830 | -74.84700 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 34.87  | 39.19830 | -74.70960 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 9.93   | 39.20000 | -74.82020 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 8.76   | 39.20000 | -74.85010 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 8.70   | 39.20030 | -74.70670 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 15.12  | 39.20180 | -74.88590 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 22.38  | 39.20100 | -74.87800 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 12.81  | 39.20320 | -74.85620 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 10.43  | 39.20380 | -74.70600 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 11.11  | 39.20520 | -74.84700 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 4.53   | 39.20610 | -74.88480 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 10.39  | 39.20610 | -74.88220 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 11.16  | 39.20630 | -74.89910 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 32.68  | 39.20770 | -74.87270 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 52.47  | 39.20900 | -74.81480 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 3.15   | 39.21090 | -74.84960 | 0 - 5.6    | 4.5 - 5.0  |

| TYPE02      | acres  | latitude | longitude | 50m_windsp | 30m_windsp |
|-------------|--------|----------|-----------|------------|------------|
| AGRICULTURE | 85.85  | 39.20710 | -74.89160 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 29.07  | 39.21040 | -74.69920 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 18.72  | 39.20950 | -74.91140 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 3.98   | 39.21270 | -74.81030 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 3.81   | 39.21390 | -74.69850 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 25.68  | 39.21200 | -74.90120 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 5.19   | 39.21440 | -74.81200 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 54.03  | 39.21330 | -74.78560 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 3.74   | 39.21530 | -74.80860 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 3.70   | 39.21650 | -74.91640 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 3.09   | 39.21740 | -74.69450 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 6.76   | 39.21760 | -74.69210 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 4.42   | 39.21930 | -74.82430 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 29.73  | 39.21760 | -74.91000 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 9.48   | 39.22240 | -74.77890 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 7.20   | 39.22450 | -74.82300 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 30.19  | 39.22230 | -74.83170 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 12.41  | 39.22500 | -74.78340 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 79.09  | 39.22260 | -74.90890 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 4.06   | 39.22640 | -74.80330 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 17.98  | 39.22510 | -74.84280 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 5.24   | 39.22760 | -74.70690 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 3.52   | 39.22870 | -74.68780 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 5.63   | 39.22900 | -74.83850 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 5.18   | 39.22940 | -74.79270 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 103.13 | 39.22670 | -74.81010 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 7.95   | 39.23080 | -74.83450 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 14.88  | 39.22970 | -74.68040 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 19.85  | 39.23170 | -74.80140 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 20.09  | 39.23280 | -74.83000 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 9.13   | 39.23370 | -74.70570 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 16.10  | 39.23370 | -74.67650 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 14.29  | 39.23410 | -74.83570 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 3.75   | 39.23470 | -74.86790 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 97.85  | 39.23060 | -74.82470 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 14.56  | 39.23500 | -74.81070 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 15.62  | 39.23580 | -74.80210 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 3.07   | 39.23760 | -74.67920 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 4.99   | 39.23680 | -74.79800 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 3.38   | 39.23720 | -74.83000 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 3.27   | 39.23740 | -74.82760 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 7.41   | 39.23780 | -74.80670 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 5.71   | 39.23830 | -74.87320 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 72.52  | 39.23820 | -74.83850 | 0 - 5.6    | 4.5 - 5.0  |

| TYPE02      | acres  | latitude      | longitude | 50m_windsp | 30m_windsp |
|-------------|--------|---------------|-----------|------------|------------|
| AGRICULTURE | 5.56   | 39.24010      | -74.80560 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 3.69   | 39.24150      | -74.82390 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 16.33  | 39.24200      | -74.84020 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 4.88   | 39.24360      | -74.74650 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 14.52  | 39.24500      | -74.73010 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 12.91  | 39.24810      | -74.74630 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 4.89   | 39.24960      | -74.74150 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 3.07   | 39.25060      | -74.69940 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 18.49  | 39.24940      | -74.89200 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 4.47   | 39.25200      | -74.70140 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 14.56  | 39.25180      | -74.72630 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 5.03   | 39.25280      | -74.73500 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 4.05   | 39.25270      | -74.72070 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 9.59   | 39.25620      | -74.65430 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 13.34  | 39.25700      | -74.72630 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 4.52   | 39.25730      | -74.73360 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 5.66   | 39.25640      | -74.87450 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 17.30  | 39.25780      | -74.71660 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 3.49   | 39.25860      | -74.73470 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 4.04   | 39.25810      | -74.87080 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 10.33  | 39.25910      | -74.72510 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 7.11   | 39.25840      | -74.87230 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 43.48  | 39.25820      | -74.67440 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 37.09  | 39.25840      | -74.74040 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 10.09  | 39.26030      | -74.71970 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 4.51   | 39.26120      | -74.74790 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 158.54 | 39.25810      | -74.88470 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 20.02  | 39.26300      | -74.87960 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 29.12  | 39.26280      | -74.67030 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 11.45  | 39.26400      | -74.71970 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 22.83  | 39.26390      | -74.85890 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 30.41  | 39.26350      | -74.86700 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 40.03  | 39.26470      | -74.86990 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 18.17  | 39.26670      | -74.67730 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 19.77  | 39.26720      | -74.86150 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 4.92   | 39.26850      | -74.85870 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 6.48   | 39.26820      | -74.86600 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 4.74   | 4.74 39.26980 | -74.65180 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 5.34   | 5.34 39.26950 | -74.64080 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 4.97   | 39.26940      | -74.86900 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 9.82   | 39.26850      | -74.73490 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 10.55  | 39.27010      | -74.66680 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 3.73   | 3.73 39.27200 | -74.65590 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 7.06   | 39.27240      | -74.73210 | 0 - 5.6    | 4.5 - 5.0  |

| TYPE02      | acres  | latitude | longitude | 50m_windsp | 30m_windsp |
|-------------|--------|----------|-----------|------------|------------|
| AGRICULTURE | 4.13   | 39.27260 | -74.86360 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 70.65  | 39.27060 | -74.74230 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 4.95   | 39.27400 | -74.80610 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 4.15   | 39.27710 | -74.74920 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 19.72  | 39.27590 | -74.74230 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 14.02  | 39.27900 | -74.85310 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 10.71  | 39.28070 | -74.75950 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 60.46  | 39.27980 | -74.84490 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 5.03   | 39.28190 | -74.63290 | 5.6 - 6.4  | 5.5 - 6.0  |
| AGRICULTURE | 25.22  | 39.28170 | -74.79280 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 9.40   | 39.28310 | -74.85230 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 6.21   | 39.28690 | -74.76670 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 7.39   | 39.28630 | -74.76010 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 10.71  | 39.28960 | -74.77920 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 7.01   | 39.29040 | -74.75030 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 3.19   | 39.29330 | -74.75420 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 3.66   | 39.29310 | -74.76220 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 4.10   | 39.29450 | -74.76690 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 4.38   | 39.29390 | -74.86020 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 163.17 | 39.28930 | -74.85390 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 36.73  | 39.29540 | -74.75860 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 3.44   | 39.30060 | -74.79540 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 14.37  | 39.29960 | -74.79350 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 33.12  | 39.30010 | -74.78490 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 5.26   | 39.30230 | -74.79460 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 6.01   | 39.30170 | -74.81300 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 3.65   | 39.30260 | -74.81490 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 31.80  | 39.30360 | -74.83000 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 77.09  | 39.30340 | -74.80130 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 17.68  | 39.30510 | -74.83490 | 0 - 5.6    | 4.5 - 5.0  |
| AGRICULTURE | 3.50   | 39.30910 | -74.83270 | 0 - 5.6    | 4.5 - 5.0  |



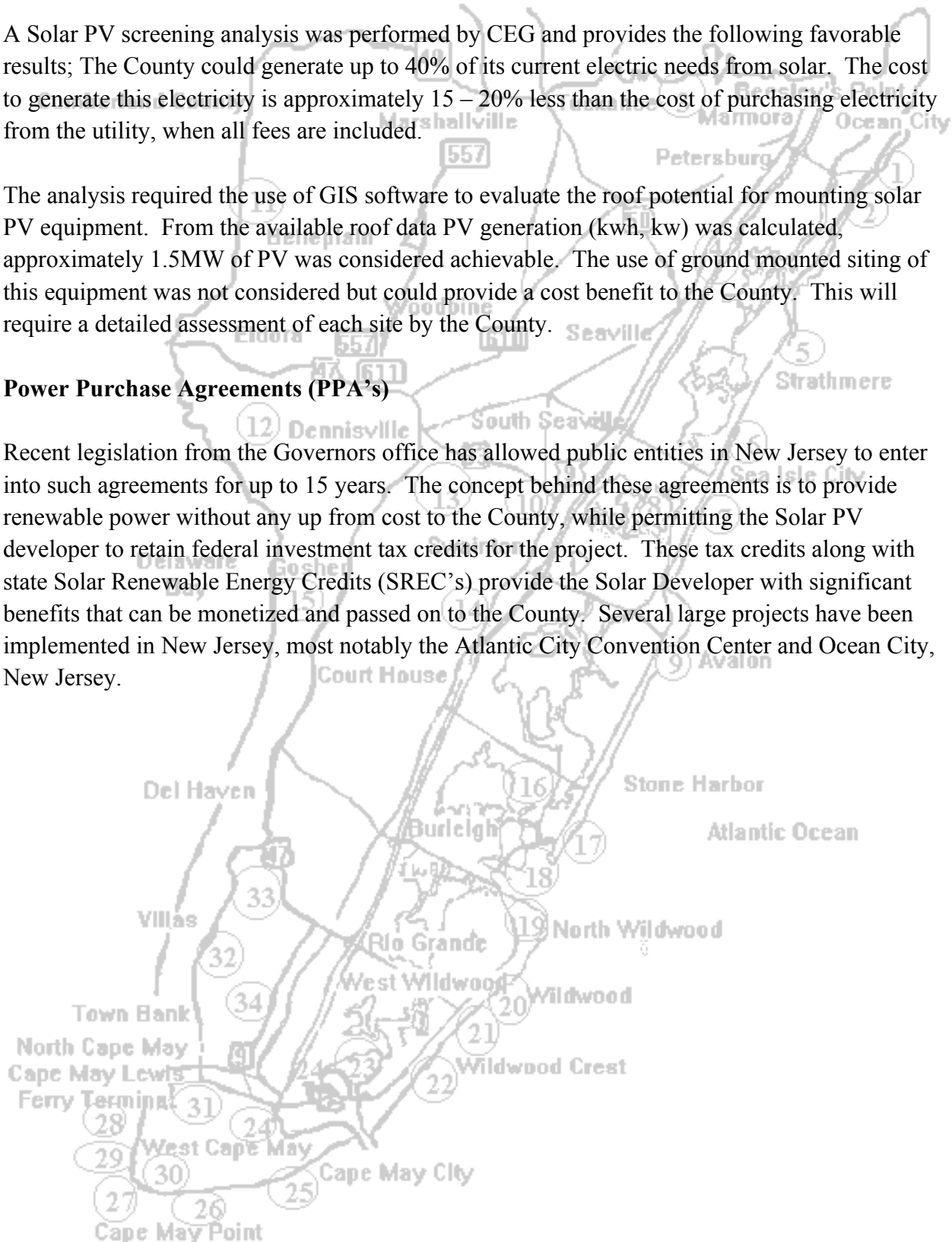
## 5.0 – Solar Photo Voltaics

A Solar PV screening analysis was performed by CEG and provides the following favorable results; The County could generate up to 40% of its current electric needs from solar. The cost to generate this electricity is approximately 15 – 20% less than the cost of purchasing electricity from the utility, when all fees are included.

The analysis required the use of GIS software to evaluate the roof potential for mounting solar PV equipment. From the available roof data PV generation (kwh, kw) was calculated, approximately 1.5MW of PV was considered achievable. The use of ground mounted siting of this equipment was not considered but could provide a cost benefit to the County. This will require a detailed assessment of each site by the County.

### Power Purchase Agreements (PPA's)

Recent legislation from the Governors office has allowed public entities in New Jersey to enter into such agreements for up to 15 years. The concept behind these agreements is to provide renewable power without any up front cost to the County, while permitting the Solar PV developer to retain federal investment tax credits for the project. These tax credits along with state Solar Renewable Energy Credits (SREC's) provide the Solar Developer with significant benefits that can be monetized and passed on to the County. Several large projects have been implemented in New Jersey, most notably the Atlantic City Convention Center and Ocean City, New Jersey.



**Cape May County-Photovoltaic Summary**

| <b>Building Description</b>     | <b>System Size kW</b> | <b>Estimated Annual Generation</b>  | <b>Current Annual Electric Usage</b>      |                        |
|---------------------------------|-----------------------|-------------------------------------|---|------------------------|
| Administration Building         | 338.10                | 482,894                             | 1,254,643                                 |                        |
| Correctional Center             | 386.40                | 551,879                             | 1,545,040                                 |                        |
| Election Board Airport          | 34.04                 | 42,857                              | 59,893                                    |                        |
| Fare Free Building #100         | 13.80                 | 17,375                              | 27,756                                    |                        |
| Health Department               | 179.40                | 256,230                             | 424,080                                   |                        |
| Lower TWP Library               | 29.90                 | 42,877                              |   |                        |
| Upper TWP Library               | 29.90                 | 42,877                              |   |                        |
| Main Court House                | 305.90                | 436,904                             | 2,008,867                                 |                        |
| Prosecutor Task Force           | 80.50                 | 117,628                             | 224,480                                   |                        |
| Mosquito Commission             | 115.00                | 164,250                             | 97,040                                    |                        |
| <b>Total System Size</b>        | <b>1,512.94</b>       | <b>2,155,771</b>                    | <b>5,641,799</b>                          |                        |
| <b>Est. System Cost</b>         | <b>\$10,968,815</b>   | @ \$7.25 per Watt                   |   |                        |
| <b>Annual SREC Revenue</b>      | <b>\$646,731</b>      |                                     |   |                        |
| <b>REC Value</b>                | <b>\$0.3300</b>       | per kWh                             |   |                        |
| <b>Average Electricity Cost</b> | <b>\$0.1500</b>       | per kWh                             |   |                        |
| <b>PPA Est. Electric Cost</b>   | <b>\$0.0900</b>       | per kWh                             |   |                        |
| <b>Maintenance Cost</b>         | <b>\$0.0010</b>       | per kWh                             |   |                        |
| <b>Energy Cost Escalation</b>   | <b>3.00%</b>          |                                     |   |                        |
| <b>PPA Electric Cost Esc.</b>   | <b>2.00%</b>          |                                     |   |                        |
|                                 |                       |                                     |   |                        |
|                                 | <b>Year</b>           | <b>Current Annual Electric Cost</b> | <b>Est. Annual Electric Cost with PPA</b> | <b>Percent Savings</b> |
|                                 | 1                     | \$846,270                           | \$716,924                                 | 15.28%                 |
|                                 | 2                     | \$871,658                           | \$736,491                                 | 15.51%                 |
|                                 | 3                     | \$897,808                           | \$756,607                                 | 15.73%                 |
|                                 | 4                     | \$924,742                           | \$777,286                                 | 15.95%                 |
|                                 | 5                     | \$952,484                           | \$798,546                                 | 16.16%                 |
|                                 | 6                     | \$981,059                           | \$820,402                                 | 16.38%                 |
|                                 | 7                     | \$1,010,490                         | \$842,872                                 | 16.59%                 |
|                                 | 8                     | \$1,040,805                         | \$865,974                                 | 16.80%                 |
|                                 | 9                     | \$1,072,029                         | \$889,724                                 | 17.01%                 |
|                                 | 10                    | \$1,104,190                         | \$914,143                                 | 17.21%                 |
|                                 | 11                    | \$1,137,316                         | \$939,248                                 | 17.42%                 |
|                                 | 12                    | \$1,171,435                         | \$965,060                                 | 17.62%                 |
|                                 | 13                    | \$1,206,578                         | \$991,600                                 | 17.82%                 |
|                                 | 14                    | \$1,242,776                         | \$1,018,887                               | 18.02%                 |
|                                 | 15                    | \$1,280,059                         | \$1,046,944                               | 18.21%                 |

**CMC Solar Project  
Self Financed 90%-15 Year Term-7.0% Interest Rate**

|                     |              |                        |          |          |       |
|---------------------|--------------|------------------------|----------|----------|-------|
| Total Project Cost  | \$10,968,815 | System Size (kW)       | 1,512.94 | Tax Rate | 35.0% |
| NJ BPU Grant        | \$0          | Utility Rate (\$/kWh)  | \$0.1500 |          |       |
| Net Project Cost    | \$10,968,815 | Utility Rate Inflation | 3.00%    |          |       |
| Percent Financed    | 90%          | REC Value (\$/kWh)     | \$0.330  |          |       |
| Capital Outlay      | \$1,086,882  | Term (Years)           | 15       |          |       |
| Financing Principal | \$9,871,934  | Rate                   | 7.0%     |          |       |

| Year   | 0 | 1           | 2           | 3           | 4           | 5           | 6           | 7           | 8           | 9           | 10          | 11          | 12           |
|--|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
| Solar Generation (kWh)                             |   | 2,155,771   | 2,144,992   | 2,134,267   | 2,123,598   | 2,112,978   | 2,102,413   | 2,091,901   | 2,081,441   | 2,071,034   | 2,060,679   | 2,050,376   | 2,040,124    |
| Utility Rate per kWh                               |   | \$0.150     | \$0.155     | \$0.159     | \$0.164     | \$0.169     | \$0.174     | \$0.179     | \$0.184     | \$0.190     | \$0.196     | \$0.202     | \$0.208      |
| Federal Tax Credit                                 |   | \$3,290,645 |             |             |             |             |             |             |             |             |             |             |              |
| Cash effect of depreciation                        |   | \$537,472   | \$559,955   | \$575,973   | \$590,584   | \$609,584   | \$624,792   | \$637,476   | \$648,987   | \$659,829   | \$670,108   | \$679,930   | \$688,291    |
| Avoided Utility Print (from Solar Generation)      |   | \$323,366   | \$331,401   | \$339,637   | \$348,077   | \$356,726   | \$365,591   | \$374,676   | \$383,987   | \$393,529   | \$403,306   | \$413,330   | \$423,601    |
| Revenue from REC Sale                              |   | \$711,404   | \$707,847   | \$704,308   | \$700,787   | \$697,283   | \$693,796   | \$690,327   | \$686,876   | \$683,441   | \$680,024   | \$676,624   | \$673,241    |
| Subtotal   |   | \$4,862,887 | \$1,889,204 | \$1,559,918 | \$1,358,447 | \$1,363,593 | \$1,059,387 | \$1,065,003 | \$1,070,862 | \$1,076,970 | \$1,083,332 | \$1,089,954 | \$1,096,842  |
| Finance payment                                    |   | #####       | #####       | #####       | #####       | #####       | #####       | #####       | #####       | #####       | #####       | #####       | #####        |
| Interest expense                                   |   | (\$891,035) | (\$863,536) | (\$834,111) | (\$802,627) | (\$768,939) | (\$732,893) | (\$694,323) | (\$653,054) | (\$608,896) | (\$561,647) | (\$511,090) | (\$456,994)  |
| Operations & Maintenance                           |   | \$0         | \$0         | \$0         | \$0         | \$0         | (\$2,102)   | (\$2,195)   | (\$2,250)   | (\$2,297)   | (\$2,336)   | (\$2,371)   | (\$2,510)    |
| Subtotal   |   | (\$891,035) | (\$863,536) | (\$834,111) | (\$802,627) | (\$768,939) | (\$732,893) | (\$694,323) | (\$653,054) | (\$608,896) | (\$561,647) | (\$511,090) | (\$456,994)  |
| Net Savings  |   | \$4,171,851 | \$1,235,668 | \$925,806   | \$755,820   | \$794,654   | \$624,392   | \$666,514   | \$616,578   | \$665,777   | \$719,319   | \$776,427   | \$837,337    |
| Taxes on net savings (no tax on principle payment) |   | (\$120,307) | (\$131,499) | (\$145,442) | (\$156,183) | (\$169,774) | (\$179,360) | (\$198,980) | (\$215,452) | (\$233,022) | (\$251,762) | (\$271,749) | (\$293,068)  |
| Net savings after taxes                            |   | \$4,051,544 | \$1,104,169 | \$780,364   | \$599,637   | \$624,879   | \$445,032   | \$467,534   | \$401,126   | \$432,755   | \$467,557   | \$504,677   | \$544,269    |
| Principal Payment                                  |   | (\$392,850) | (\$420,349) | (\$448,774) | (\$481,258) | (\$514,946) | (\$550,892) | (\$589,562) | (\$630,831) | (\$674,889) | (\$722,238) | (\$772,795) | (\$826,891)  |
| Net Cash Flow After Taxes                          |   | \$3,658,694 | \$683,819   | \$332,591   | \$118,379   | \$109,933   | (\$155,960) | (\$220,028) | (\$230,706) | (\$242,234) | (\$254,681) | (\$268,118) | (\$282,622)  |
| Cumulative savings before taxes                    |   | \$4,171,851 | \$5,407,519 | \$6,333,326 | \$7,089,145 | \$7,883,799 | \$8,408,191 | \$8,976,705 | \$9,592,283 | #####       | #####       | #####       | \$12,591,142 |

| Year   | 13 | 14            | 15          | 16          | 17          | 18          | 19          | 20          | 21          | 22          | 23          | 24          | 25          |
|--|----|---------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Solar Generation (kWh)                             |    | 2,029,923     | 2,019,774   | 2,009,675   | 1,999,626   | 1,989,628   | 1,979,680   | 1,969,782   | 1,959,933   | 1,950,133   | 1,940,382   | 1,930,680   | 1,921,027   |
| Utility Rate per kWh                               |    | \$0.214       | \$0.220     | \$0.227     | \$0.234     | \$0.241     | \$0.248     | \$0.255     | \$0.263     | \$0.271     | \$0.279     | \$0.287     | \$0.296     |
| Federal Tax Credit                                 |    |               |             |             |             |             |             |             |             |             |             |             |             |
| Subtotal   |    | \$434,128     | \$444,916   | \$455,972   | \$467,303   | \$478,915   | \$490,816   | \$503,013   | \$515,513   | \$528,324   | \$541,452   | \$554,908   | \$568,697   |
| Avoided Utility Print (from Solar Generation)      |    | \$669,875     | \$665,525   | \$661,193   | \$656,877   | \$652,584   | \$648,328   | \$644,111   | \$640,028   | \$636,069   | \$632,234   | \$628,521   | \$624,929   |
| Revenue from REC sale                              |    | \$1,104,002   | \$1,111,441 | \$1,119,165 | \$1,127,180 | \$1,135,493 | \$1,144,111 | \$1,153,041 | \$1,162,291 | \$1,171,867 | \$1,181,779 | \$1,192,032 | \$1,202,636 |
| Subtotal   |    | (\$1,083,885) | #####       | #####       | #####       | #####       | #####       | #####       | #####       | #####       | #####       | #####       | #####       |
| Finance payment                                    |    | (\$189,112)   | (\$137,178) | (\$70,908)  | (\$0)       | (\$0)       | (\$0)       | (\$0)       | (\$0)       | (\$0)       | (\$0)       | (\$0)       | (\$0)       |
| Interest expense                                   |    | (\$2,586)     | (\$2,663)   | (\$2,743)   | (\$2,825)   | (\$2,910)   | (\$2,998)   | (\$3,087)   | (\$3,180)   | (\$3,275)   | (\$3,374)   | (\$3,475)   | (\$3,579)   |
| Operations & Maintenance                           |    | (\$201,698)   | (\$193,841) | (\$186,552) | (\$179,825) | (\$173,652) | (\$168,021) | (\$162,928) | (\$158,369) | (\$154,341) | (\$150,849) | (\$147,889) | (\$145,467) |
| Subtotal   |    | \$902,305     | \$971,600   | \$1,045,513 | \$1,124,354 | \$1,132,562 | \$1,141,113 | \$1,149,954 | \$1,159,111 | \$1,168,592 | \$1,178,405 | \$1,188,557 | \$1,199,057 |
| Taxes on net savings (no tax on principle payment) |    | (\$315,807)   | (\$340,060) | (\$365,930) | (\$393,524) | (\$396,404) | (\$399,390) | (\$402,464) | (\$409,007) | (\$412,442) | (\$415,995) | (\$419,670) | (\$423,469) |
| Net savings after taxes                            |    | \$586,498     | \$631,540   | \$679,583   | \$730,830   | \$736,179   | \$741,724   | \$747,470   | \$753,422   | \$759,585   | \$765,963   | \$772,562   | \$779,387   |
| Principal Payment                                  |    | (\$684,773)   | (\$846,707) | #####       | #####       | #####       | #####       | #####       | #####       | #####       | #####       | #####       | #####       |
| Net Cash Flow After Taxes                          |    | (\$298,275)   | (\$315,167) | (\$333,393) | \$730,830   | \$736,179   | \$741,724   | \$747,470   | \$753,422   | \$759,585   | \$765,963   | \$772,562   | \$779,387   |
| Cumulative savings before taxes                    |    | \$13,493,447  | #####       | #####       | #####       | #####       | #####       | #####       | #####       | #####       | #####       | #####       | #####       |

|                                     |             |
|-------------------------------------|-------------|
| Internal Rate of Return After Taxes | 25.4%       |
| NPV of After Tax Cash Flows         | \$3,478,721 |
| NPV Discount Rate                   | 8.00%       |

These Figures are estimates for discussion only.

**CMC Solar Project Purchase**

Total Project Cost 1,512.94 Tax Rate 35.0%  
 NJ BPU Grant \$0.1500  
 Net Project Cost \$10,968.815  
 Capital Outlay \$0.330  
 System Size (kW) 1,512.94  
 Utility Rate (\$/kWh) \$0.1500  
 Utility Rate Inflation 3.00%  
 REC Value (\$/kWh) year 1-25 \$0.330

| Year   | 0 | 1              | 2             | 3             | 4             | 5             | 6           | 7           | 8           | 9           | 10          | 11          | 12          |
|--|---|----------------|---------------|---------------|---------------|---------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Solar Generation (kWh)                       |   | 2,165,771      | 2,144,992     | 2,134,267     | 2,123,596     | 2,112,978     | 2,102,413   | 2,091,901   | 2,081,441   | 2,071,034   | 2,060,679   | 2,050,376   | 2,040,124   |
| Utility Rate per kWh                         |   | \$0.150        | \$0.155       | \$0.159       | \$0.164       | \$0.169       | \$0.174     | \$0.179     | \$0.184     | \$0.190     | \$0.196     | \$0.202     | \$0.208     |
| Capital Outlay                               |   |                |               |               |               |               |             |             |             |             |             |             |             |
| Tax Credit                                   |   | \$3,290,645    |               |               |               |               |             |             |             |             |             |             |             |
| Cash effect of depreciation                  |   | \$537,472      | \$859,956     | \$515,973     | \$309,584     | \$309,584     | \$154,792   |             |             |             |             |             |             |
| Avoided Utility Pymt (from Solar Generation) |   | \$323,366      | \$331,401     | \$339,637     | \$348,077     | \$356,591     | \$365,091   | \$374,676   | \$383,887   | \$393,529   | \$403,308   | \$413,330   | \$423,601   |
| Revenue from REC Sale                        |   | \$711,404      | \$707,404     | \$704,308     | \$700,787     | \$697,283     | \$693,796   | \$690,327   | \$686,841   | \$683,441   | \$680,024   | \$676,624   | \$673,241   |
| Subtotal                                     |   | \$4,862,887    | \$1,899,204   | \$1,559,918   | \$1,358,447   | \$1,353,593   | \$1,214,179 | \$1,065,003 | \$1,070,862 | \$1,076,970 | \$1,083,332 | \$1,089,954 | \$1,096,842 |
| Operations & Maintenance                     |   | \$0            | \$0           | \$0           | \$0           | \$0           | (\$2,102)   | (\$2,165)   | (\$2,230)   | (\$2,297)   | (\$2,366)   | (\$2,437)   | (\$2,510)   |
| Subtotal                                     |   | \$0            | \$0           | \$0           | \$0           | \$0           | (\$2,102)   | (\$2,165)   | (\$2,230)   | (\$2,297)   | (\$2,366)   | (\$2,437)   | (\$2,510)   |
| Net Savings                                  |   | \$4,862,887    | \$1,899,204   | \$1,559,918   | \$1,358,447   | \$1,353,593   | \$1,212,077 | \$1,062,838 | \$1,068,632 | \$1,074,673 | \$1,080,966 | \$1,087,517 | \$1,094,332 |
| Taxes on net savings                         |   | (\$362,170)    | (\$363,737)   | (\$365,381)   | (\$367,102)   | (\$368,903)   | (\$371,521) | (\$373,509) | (\$375,582) | (\$377,744) | (\$379,994) | (\$382,337) | (\$384,773) |
| Net Savings after taxes                      |   | \$4,500,717    | \$1,535,467   | \$1,194,537   | \$991,345     | \$994,690     | \$840,555   | \$689,329   | \$693,049   | \$696,929   | \$700,971   | \$705,180   | \$709,558   |
| Cumulative Savings                           |   | (\$10,968.815) | (\$6,105,928) | (\$4,206,725) | (\$2,646,807) | (\$1,288,360) | \$75,233    | \$1,287,310 | \$2,350,147 | \$3,418,779 | \$4,493,452 | \$5,574,417 | \$6,661,934 |

| Year   | 13          | 14          | 15           | 16           | 17           | 18           | 19           | 20           | 21           | 22           | 23           | 24           | 25           |
|--|-------------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Solar Generation (kWh)                       | 2,029,923   | 2,019,774   | 2,009,675    | 1,999,626    | 1,989,628    | 1,979,680    | 1,969,782    | 1,959,933    | 1,950,133    | 1,940,382    | 1,930,680    | 1,921,027    | 1,911,422    |
| Utility Rate per kWh                         | \$0.214     | \$0.220     | \$0.227      | \$0.234      | \$0.241      | \$0.248      | \$0.255      | \$0.263      | \$0.271      | \$0.279      | \$0.287      | \$0.296      | \$0.305      |
| Avoided Utility Pymt (from Solar Generation) | \$434,128   | \$444,916   | \$455,972    | \$467,303    | \$478,915    | \$490,816    | \$503,013    | \$515,513    | \$528,324    | \$541,452    | \$554,908    | \$568,697    | \$582,829    |
| Revenue from REC sale                        | \$659,875   | \$656,525   | \$653,193    | \$650,877    | \$648,577    | \$646,294    | \$644,028    | \$641,778    | \$639,544    | \$637,325    | \$635,125    | \$633,939    | \$632,769    |
| Subtotal                                     | \$1,104,002 | \$1,111,441 | \$1,119,165  | \$1,127,180  | \$1,135,493  | \$1,144,111  | \$1,153,041  | \$1,162,291  | \$1,171,867  | \$1,181,779  | \$1,192,032  | \$1,202,636  | \$1,213,598  |
| Operations & Maintenance                     |             | (\$2,611)   | (\$2,824)    | (\$2,824)    | (\$2,837)    | (\$3,054)    | (\$3,304)    | (\$3,436)    | (\$3,573)    | (\$3,716)    | (\$3,865)    | (\$4,019)    | (\$4,180)    |
| Subtotal                                     |             | (\$2,611)   | (\$2,824)    | (\$2,824)    | (\$2,837)    | (\$3,054)    | (\$3,304)    | (\$3,436)    | (\$3,573)    | (\$3,716)    | (\$3,865)    | (\$4,019)    | (\$4,180)    |
| Net Savings                                  | \$1,101,392 | \$1,108,726 | \$1,116,341  | \$1,124,243  | \$1,132,438  | \$1,140,934  | \$1,149,738  | \$1,158,856  | \$1,168,294  | \$1,178,063  | \$1,188,167  | \$1,198,617  | \$1,209,418  |
| Taxes on net savings                         | (\$385,487) | (\$386,054) | (\$390,719)  | (\$393,485)  | (\$399,327)  | (\$402,408)  | (\$405,599)  | (\$408,903)  | (\$412,322)  | (\$415,859)  | (\$419,516)  | (\$423,296)  | (\$427,206)  |
| Net Savings after taxes                      | \$715,905   | \$720,672   | \$725,622    | \$730,758    | \$736,086    | \$741,607    | \$747,329    | \$753,256    | \$759,391    | \$765,741    | \$772,309    | \$779,101    | \$786,122    |
| Cumulative Savings                           | \$8,857,657 | \$9,966,383 | \$11,082,724 | \$12,206,967 | \$13,339,405 | \$14,480,339 | \$15,630,077 | \$16,788,932 | \$17,957,227 | \$19,135,289 | \$20,323,457 | \$21,522,073 | \$22,731,492 |

|                                |             |
|--------------------------------|-------------|
| After Tax IRR                  | 10.8%       |
| NPV of Net Savings After Taxes | \$1,632,920 |
| NPV Discount Rate              | 8.00%       |

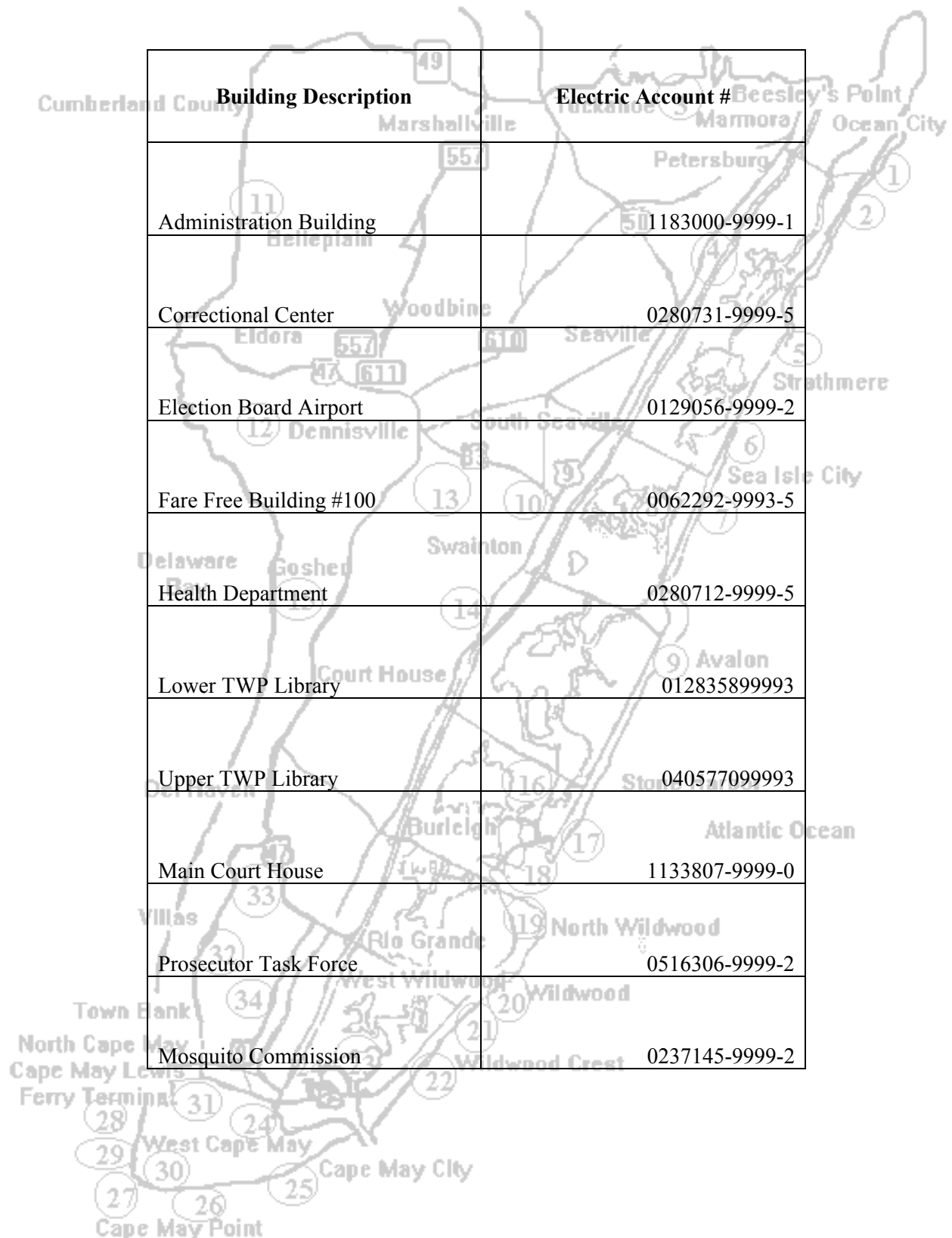
**CMC Solar Project  
Depreciation Calculations**

|                            |                     |
|----------------------------|---------------------|
| Project Cost               | \$10,988,815        |
| NJ BPU Grant               | \$0                 |
| Net Project Cost           | <u>\$10,988,815</u> |
| Federal Tax Credit         | \$3,290,645         |
| Federal Depreciation Basis | \$7,678,171         |
| Federal Tax Rate           | 35%                 |

| Year                                     | 0 | 1           | 2           | 3           | 4         | 5         | 6         | 7   | 8   | 9   | 10  | 11  | 12  |
|--|---|-------------|-------------|-------------|-----------|-----------|-----------|-----|-----|-----|-----|-----|-----|
| Depreciation percentage - Federal        |   | 20.00%      | 32.00%      | 19.20%      | 11.52%    | 11.52%    | 5.76%     |     |     |     |     |     |     |
| MACRS Depreciation Amount - Federal      |   | \$1,536,634 | \$2,457,015 | \$1,474,209 | \$884,525 | \$884,525 | \$442,263 |     |     |     |     |     |     |
| Federal Tax Credit                       |   | \$3,290,645 |             |             |           |           |           |     |     |     |     |     |     |
| Cash effect of Federal depreciation      |   | \$537,472   | \$859,955   | \$515,973   | \$309,584 | \$309,584 | \$154,792 |     |     |     |     |     |     |
| Total Annual tax savings on depreciation |   | \$3,828,116 | \$859,955   | \$515,973   | \$309,584 | \$309,584 | \$154,792 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 |

These figures are estimates for discussion only. Actual results and depreciation methods may vary.

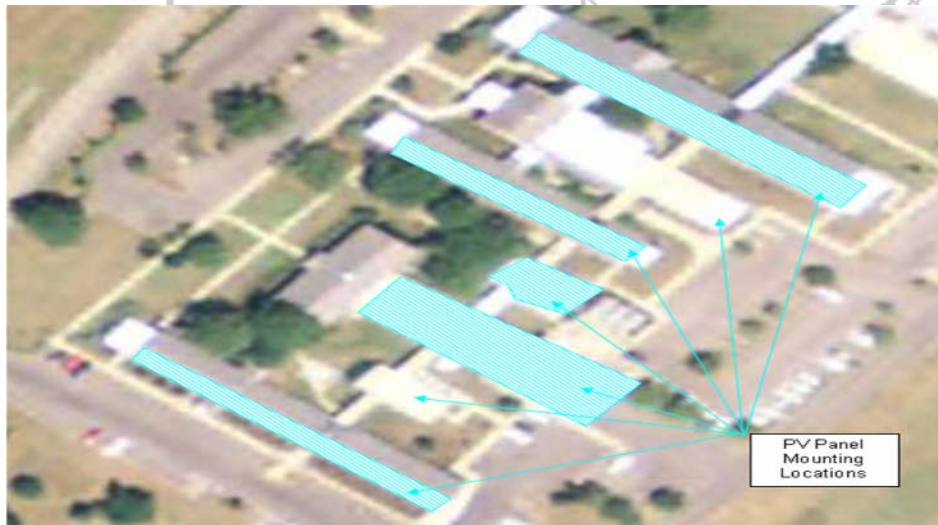
GDS MACRS, 200%  
5 years recovery, half year convention  
property placed in service first quarter



| Building Description    | Electric Account # |
|-------------------------|--------------------|
| Administration Building | 1183000-9999-1     |
| Correctional Center     | 0280731-9999-5     |
| Election Board Airport  | 0129056-9999-2     |
| Fare Free Building #100 | 0062292-9993-5     |
| Health Department       | 0280712-9999-5     |
| Lower TWP Library       | 012835899993       |
| Upper TWP Library       | 040577099993       |
| Main Court House        | 1133807-9999-0     |
| Prosecutor Task Force   | 0516306-9999-2     |
| Mosquito Commission     | 0237145-9999-2     |

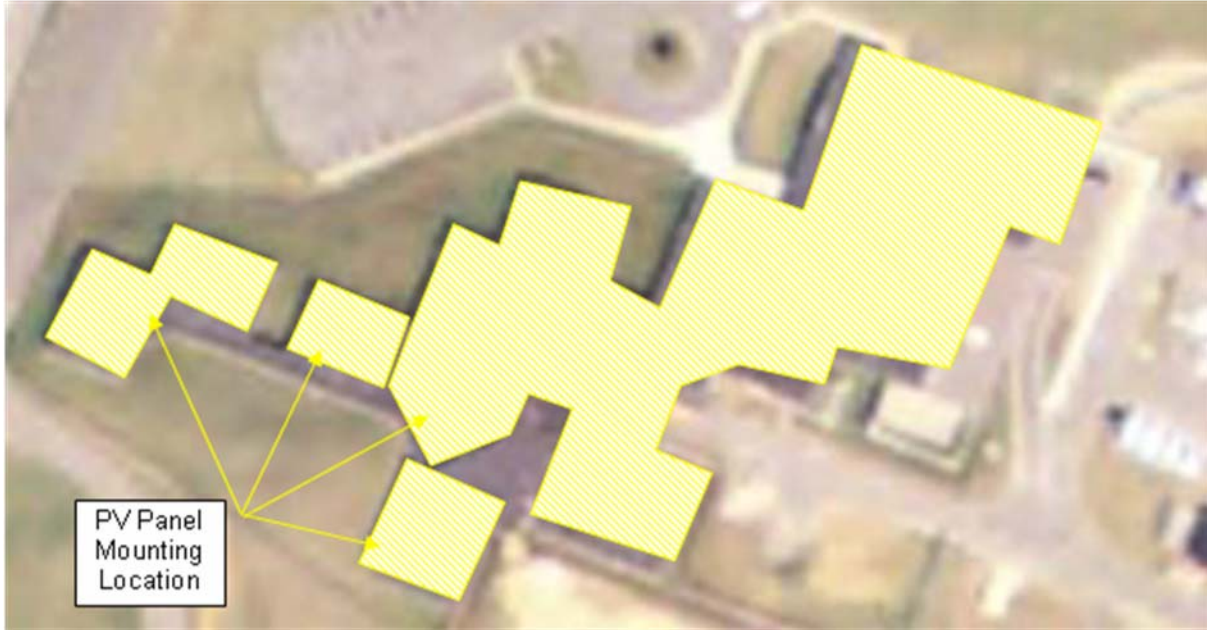
**Admin Building**

| Building                | Roof Area (sq ft) | Panel           | Qty  | Panel Sq Ft | Panel Total Sq Ft | Total KW | Total Annual kWh | Panel Weight (33 lbs) | W/SQFT |
|-------------------------|-------------------|-----------------|------|-------------|-------------------|----------|------------------|-----------------------|--------|
| Administration Building | 21,567            | Sunpower SPR230 | 1470 | 14.7        | 21,615            | 338.10   | 482,894          | 48,510                | 15.64  |



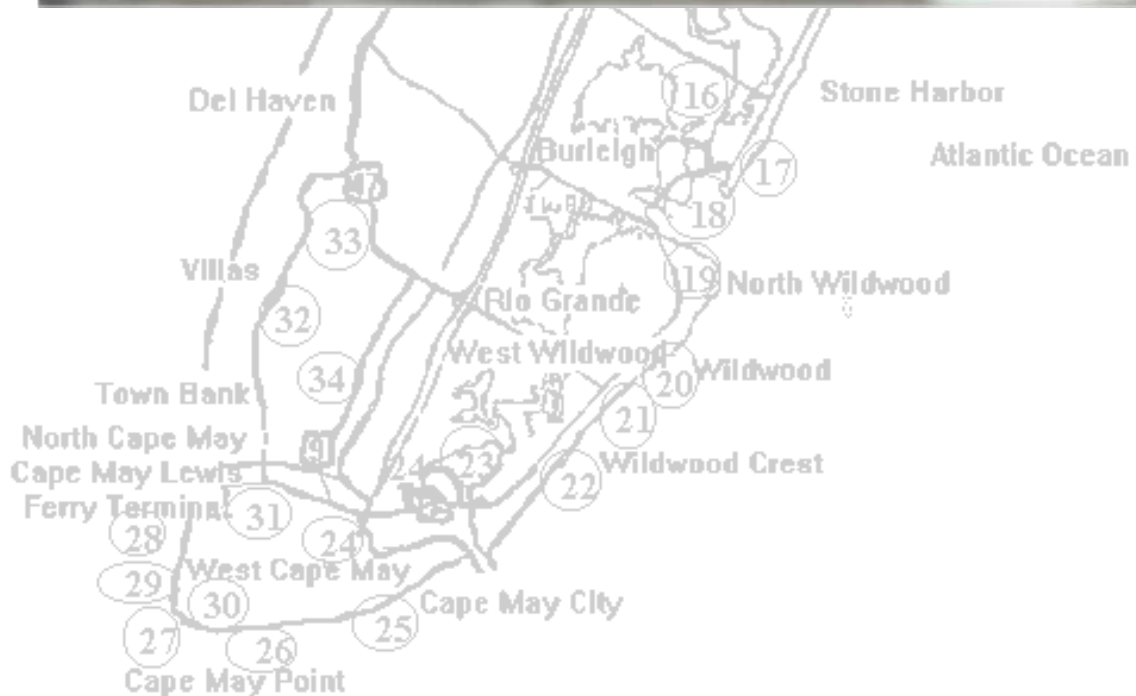
## Correctional Center

| Building            | Roof Area (sq ft) | Panel           | Qty  | Panel Sq Ft | Panel Total Sq Ft | Total KW | Total Annual kWh | Panel Weight (33 lbs) | W/SQFT |
|---------------------|-------------------|-----------------|------|-------------|-------------------|----------|------------------|-----------------------|--------|
| Correctional Center | 28,879            | Sunpower SPR230 | 1680 | 14.7        | 24,703            | 386.40   | 551,879          | 55,440                | 15.64  |



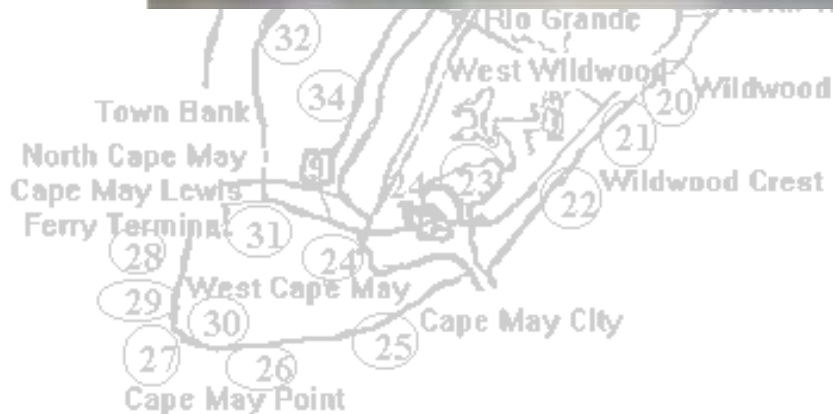
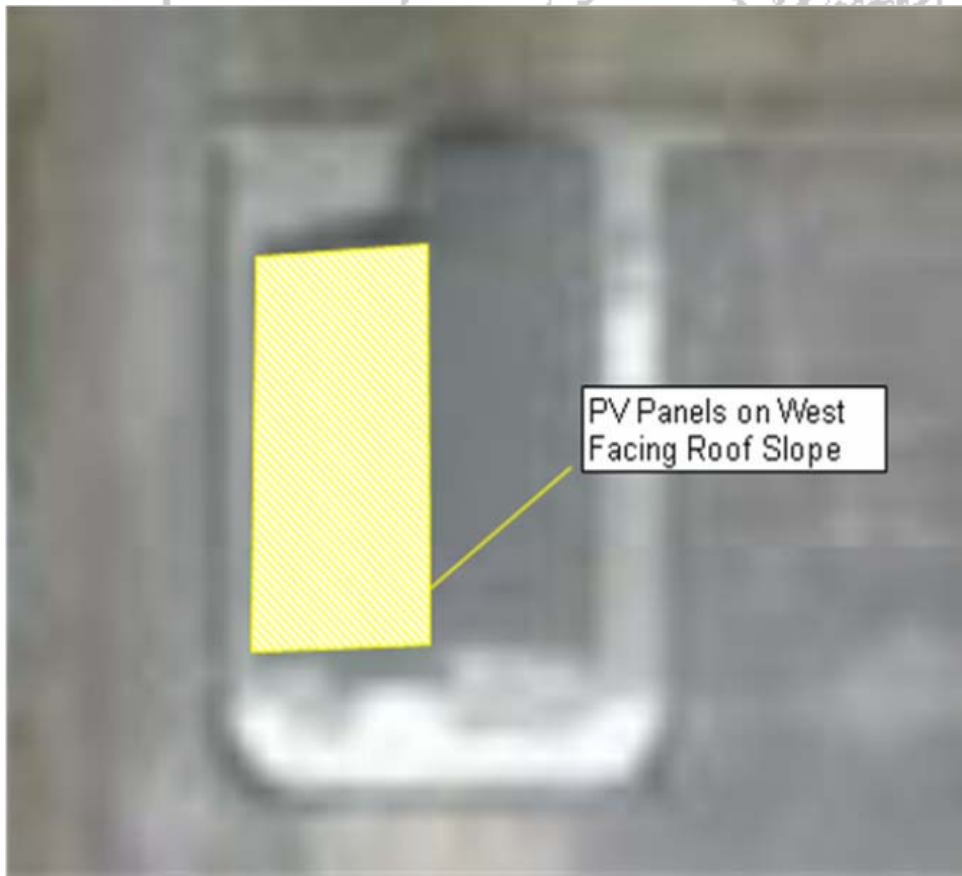
## Election Board Airport

| Building               | Roof Area (sq ft) | Panel           | Qty | Panel Sq Ft | Panel Total Sq Ft | Total KW | Total Annual kWh | Panel Weight (33 lbs) | W/SQFT |
|------------------------|-------------------|-----------------|-----|-------------|-------------------|----------|------------------|-----------------------|--------|
| Election Board Airport | 4,900             | Sunpower SPR230 | 148 | 14.7        | 2,176             | 34.04    | 42,857           | 4,884                 | 15.64  |



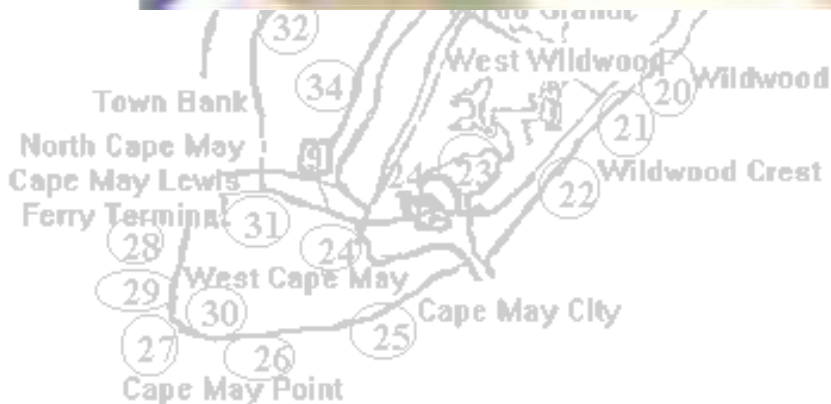
## Fare Free Building 100

| Building                | Roof Area (sq ft) | Panel           | Qty | Panel Sq Ft | Panel Total Sq Ft | Total KW | Total Annual kWh | Panel Weight (33 lbs) | W/SQFT |
|-------------------------|-------------------|-----------------|-----|-------------|-------------------|----------|------------------|-----------------------|--------|
| Fare Free Building #100 | 900               | Sunpower SPR230 | 60  | 14.7        | 882               | 13.80    | 17,375           | 1980                  | 15.64  |



## Health Department

| Building              | Roof Area (sq ft) | Panel           | Qty | Panel Sq Ft | Panel Total Sq Ft | Total KW | Total Annual kWh | Panel Weight (33 lbs) | W/SQFT |
|-----------------------|-------------------|-----------------|-----|-------------|-------------------|----------|------------------|-----------------------|--------|
| Health Dept. Building | 11,484            | Sunpower SPR230 | 780 | 14.7        | 11,469            | 179.40   | 256,230          | 25,740                | 15.64  |



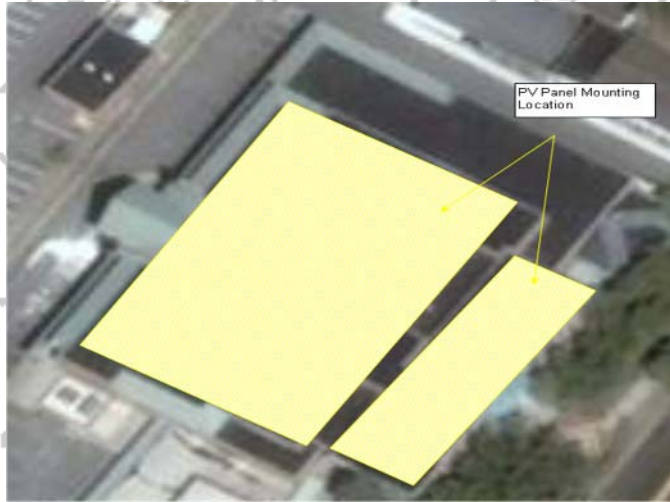
## Lower Township Library

| Building               | Roof Area (sq ft) | Panel           | Qty | Panel Sq Ft | Panel Total Sq Ft | Total KW | Total Annual kWh | Panel Weight (33 lbs) | W/SQFT |
|------------------------|-------------------|-----------------|-----|-------------|-------------------|----------|------------------|-----------------------|--------|
| Lower Township Library | 3,190             | Sunpower SPR230 | 130 | 14.7        | 1,912             | 29.90    | 42,877           | 4290                  | 15.64  |



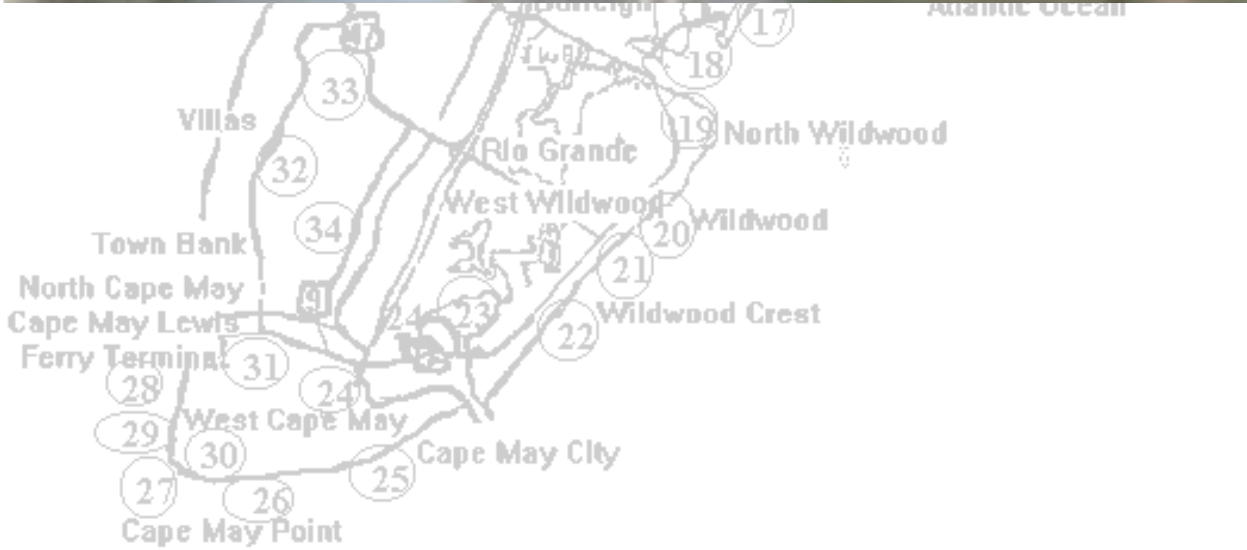
## Main Court House

| Building         | Roof Area (sq ft) | Panel           | Qty  | Panel Sq Ft | Panel Total Sq Ft | Total KW | Total Annual kWh | Panel Weight (33 lbs) | W/SQFT |
|------------------|-------------------|-----------------|------|-------------|-------------------|----------|------------------|-----------------------|--------|
| Main Court House | 19,654            | Sunpower SPR230 | 1330 | 14.7        | 19,556            | 305.90   | 436,904          | 43,890                | 15.64  |



# Mosquito Commission

| Building            | Roof Area (sq ft) | Panel           | Qty | Panel Sq Ft | Panel Total Sq Ft | Total KW | Total Annual kWh | Panel Weight (33 lbs) | W/SQFT |
|---------------------|-------------------|-----------------|-----|-------------|-------------------|----------|------------------|-----------------------|--------|
| Mosquito Commission | 4,522             | Sunpower SPR230 | 500 | 14.7        | 7,352             | 115.00   | 164,250          | 16500                 | 15.64  |



## Prosecutors Task Force

| Building               | Roof Area (sq ft) | Panel           | Qty | Panel Sq Ft | Panel Total Sq Ft | Total KW | Total Annual kWh | Panel Weight (33 lbs) | W/SQFT |
|------------------------|-------------------|-----------------|-----|-------------|-------------------|----------|------------------|-----------------------|--------|
| Prosecutors Task Force | 20,300            | Sunpower SPR230 | 350 | 14.7        | 5,146             | 80.50    | 117,628          | 11,550                | 15.64  |



## Upper Township Library

| Building               | Roof Area (sq ft) | Panel           | Qty | Panel Sq Ft | Panel Total Sq Ft | Total KW | Total Annual kWh | Panel Weight (33 lbs) | W/SQFT |
|------------------------|-------------------|-----------------|-----|-------------|-------------------|----------|------------------|-----------------------|--------|
| Upper Township Library | 3,105             | Sunpower SPR230 | 130 | 14.7        | 1,912             | 29.90    | 42,877           | 4290                  | 15.64  |

