LOCAL HISTORIC DISTRICT: Wesley Heights
PROPERTY ADDRESS: 617 Walnut Avenue
SUMMARY OF REQUEST: Addition
OWNER: Deedee Hall
APPLICANT: Deedee Hall

Details of Proposed Request
Existing Conditions
The existing structure is a 1.5 story single family home constructed in 1938. It is listed as a contributing structure in the Wesley Heights National Register. Surrounding properties are a mix of single and multi-family structures. Adjacent structures are 1 and 1.5 story single family homes.

Proposal
The proposal is the addition of solar panels on the side of the roof. Mechanical systems associated with the panels should be located in the rear of the property.

Policy & Design Guidelines
The HDC Policy & Design Guidelines do not explicitly define the location of solar panels on rooftops but considers this proposal an Addition. Ideally, solar panels should be located to the rear of a property and not substantially visible. The Secretary of Interior’s Standards states solar panels can be installed in a sensitive manner and should conform to guidance regarding rooftop additions, i.e. that they be minimally visible to avoid altering the historic character of the building. See the National Park Service’s Technical Preservation Services section on alternative energy (ITS Number 52).

Additions to existing structures in Local Historic Districts have a responsibility to complement the original structure. Additions should reflect the design, scale and architectural style of the original structure. The following guidelines are intended to encourage addition designs that are compatible with the existing structure, while not fully mimicking the original design.
2. Additions must respect the original character of the property, but must be distinguishable from the original construction.

3. All additions to the front or side of existing properties must be of a design that is sensitive to the character and massing of the existing structure.

4. Additions to the front or side of existing structures that are substantially visible from a street must go before the full Commission.

**Staff Analysis**
The Commission shall determine if the proposal meets the applicable guidelines for additions.
**The solar panels will be attached to the back right side (when facing the house as in this picture) of the rooftop, which cannot be seen from the street view.**
* Red box on back of rooftop indicates where the solar panels will be attached to the roof of the home.
Parcels Information
Parcel ID
07102208

Account
INDIVIDUAL

Parent
Previous

Owner(s)
Owner Name
KIRK HELEN B RIGHTS SURVI

Mailing Address
617 WALNUT AVE

City/State
CHARLOTTE NC 28208

Legal Information
Legal
L11 B11 M332-397

Municipality
CHARLOTTE

Date Annexed

Special District

Fire District
CITY OF CHARLOTTE

Acreage
0

Total Parcel Assessment
Building
114900

Land
76000

Features
1100

Total
192000

Exemptions

Exemption

Year Approved

Review Date

Amount

Sales Information
Sale
Aug 2 1977

Price
0

Stamps

Qualify

VI

Type
WARRANTY D

Legal Ref.
03973-515

Grantor

Land Use
Use
R100

Units
1

Type
LT

Neighborhood
H105

Assessment
76000

Building Information
Bldg
1

Description
Single-Fam

Type
RES

Year
1936

Property Location
617 WALNUT AV CHARLOTTE

Total SqFt
2214

Heated SqFt
2122

Foundation
CRAWL SPACE

Ext. Wall
FACE BRICK -

Grade
AVERAGE 03

Value
114900

Bldg Story
2.0 STORY

Units
1

Fixtures
AC-NONE

Bedrooms
3

Bldg Heat
AIR-DUCTED

Fuel GAS AC

Fire Place 1 - FP3

Full Baths
1

1/2 Baths
1

Sub Area
Size
1502

Bldg Description
BASE (FIRST FLOOR)

1

Bldg PORCH - ENCLOSSED - UNFINISHED (NO HEAT)

1

Bldg PORCH - ENCLOSSED - FINISHED (HEAT)

1

Bldg PORCH - OPEN - FINISHED

1

Bldg ATTIC - FINISHED

1

Depreciation
Physical
AV - 16.00%

Functional

Economic

Special

Override

Size
60

Special Features & Yard Items
Bldg
1

Built
1936

Type
GARAGE

Quantity
1

Units
18X18

Value
1100

Notes

Value Changes
Notice Date
Feb 8 2011

Tax Year
2011

Reason
Countywide Revaluation

Changed To
192100

Deferred
0

Jan 17 2003

2003

Countywide Revaluation

112300

0

Jan 5 1998

1998

Countywide Revaluation

73960

50500

Jan 2 1991

1991

Countywide Revaluation

http://meckcama.co.mecklenburg.nc.us/RELlookup/Property/Print?parcelid=07102208
**SINGLE LINE DIAGRAM**

**5 RENESOLA MODULES**

**#6 AWG BARE CU EQUIPMENT GROUNDING CONDUCTOR (EGC)**

**ALL EXPOSED NON-CURRENT CARRYING METAL PARTS TO BE GROUNDED**

**GROUNDING ELECTRODE CONDUCTOR (GEC) #6 BARE GROUND - NOT REQUIRED ON LATEST INTEGRATED GROUND (IG) MODULES. FIELD VERIFY.**

**ENPHASE M215 MICROINVERTER VERIFY INTEGRATED GROUND (IG) TYPE - NO GEC REQUIRED**

OR

**NON-IG TYPE - GEC REQUIRED**

**GENERAL CONDITIONS:**

A. THIS ELECTRICAL SINGLE LINE DIAGRAM IS DIAGRAMATIC ONLY AND INTENDED TO ASSIST A QUALIFIED ELECTRICAL CONTRACTOR FAMILIAR WITH PHOTOVOLTAIC REQUIREMENTS IN SIZING THE INSTALLATION OF THE PHOTOVOLTAIC SYSTEM AT THIS RESIDENCE. EXACT LOCATION AND ROUTING OF ELECTRICAL EQUIPMENT, WIRING, AND CONCEPT IS THE RESPONSIBILITY OF THE CONTRACTOR BASED ON FIELD VERIFICATION OF EXISTING CONDITIONS. THE USE OF ANY EXISTING EQUIPMENT IS THE RESPONSIBILITY OF THE CONTRACTOR BASED ON FIELD VERIFICATION OF EXISTING CONDITIONS.

B. ALL EQUIPMENT TO BE INSTALLED AND DOCUMENTED PER THE MANUFACTURER'S OPERATIONS AND INSTALLATION MANUALS, AND AS DIRECTED BY THE LOCAL AHJ.

**EXISTING GROUND**

**NOTES:**

1. EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH NEC ARTICLE 690.
2. CONDUCTORS ARE TO BE COPPER UNLESS OTHERWISE NOTED AND COMPLY WITH NEC 1901.
3. ALL PV SYSTEM COMPONENTS SHALL BE LISTED AND COMPLY WITH UL 7741 AND UL 1741.
4. WIRING MATERIALS NOT PROTECTED IN CONDUIT SHALL BE SUITABLE FOR SUN EXPOSURE AND VET LOCATIONS.
5. CIRCUIT BREAKER TO BE SUITABLE PER NEC 420.64(A3)
6. THE EQUIPMENT GROUNDING CONDUCTOR SHALL BE CONTINUOUS PER NEC 690.48.
7. THE EQUIPMENT GROUNDING CONDUCTOR SHALL BE INSTALLED IN ACCORDANCE WITH NEC 690.45, 690.45 AND 250.22.
8. THE GROUNDING ELECTRODE CONDUCTOR SHALL BE CONTINUOUS PER NEC 250.64(C) AND 690.47(A)
9. LABEL SOLAR MODULES AND POWER INVERTERS WITH LISTING AGENCY NAME AND NUMBER PER NEC 1103.59.
10. SWITCHED BREAKER SHALL BE INSTALLED AT THE OPPOSITE END OF THE BUS BAR FROM THE MAIN BREAKER.
11. AC DISCONNECT SHALL BE EXTERNALLY OPERATED KNIFE BLADE TYPE AND LOCKABLE IN THE "ON" AND "OFF" POSITIONS. VISIBLE DESIGNATIONS TO BE DIRECTLY ACCESSIBLE TO THE UTILITY.

**SOLAR MODULE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>RENESOLA</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAX POWER (In)</td>
<td>230W</td>
</tr>
<tr>
<td>POWER TOLERANCE</td>
<td>±5%</td>
</tr>
<tr>
<td>MODULE EFFICIENCY</td>
<td>15.4%</td>
</tr>
<tr>
<td>MAXIMUM POWER CURRENT (Ip)</td>
<td>9.01 A</td>
</tr>
<tr>
<td>MAXIMUM POWER VOLTAGE (Vmp)</td>
<td>381 V</td>
</tr>
<tr>
<td>SHORT CIRCUIT CURRENT (Isc)</td>
<td>9.83 A</td>
</tr>
<tr>
<td>OPEN CIRCUIT VOLTAGE (Voc)</td>
<td>37.4 V</td>
</tr>
</tbody>
</table>

**VALUES AT STANDARD TEST CONDITIONS 800 W/M² AND MAX AMPS, AMBIENT TEMPERATURE 25ºC**

**MICROINVERTER SPECIFICATIONS**

<table>
<thead>
<tr>
<th>MANUFACTURER/MODEL</th>
<th>ENPHASE M215</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAX OUTPUT POWER</td>
<td>230W</td>
</tr>
<tr>
<td>NOMINAL OUTPUT CURRENT</td>
<td>0.9 A</td>
</tr>
<tr>
<td>MAX INPUT CURRENT</td>
<td>0.5 A</td>
</tr>
<tr>
<td>MAX DC SHORT CIRCUIT CURRENT</td>
<td>10 A</td>
</tr>
<tr>
<td>GEC WEIGHTED EFFICIENCY</td>
<td>96.5%</td>
</tr>
<tr>
<td>MAXIMUM RATINGS</td>
<td></td>
</tr>
<tr>
<td>OPERATING TEMPERATURE</td>
<td>-40ºC TO 40ºC</td>
</tr>
<tr>
<td>MAXIMUM SERIES FUSE RATING</td>
<td>20A</td>
</tr>
</tbody>
</table>

**SOLDIER PV JUNCTION BOX**

UL 1741 NEMA 3R (IN ROOFTOP)

**#6 BARE GROUND (GEC)**

WHEN REQUIRED

**GLOBAL EFFICIENT ENERGY**

2320 GRAVEL DR
FORT WORTH TX 76118
682-626-5593

**ONE LINE DIAGRAM**

PHOTOVOLTAIC SYSTEM

240 VAC SINGLE PHASE
ENPHASE M215 INVERTER
5 RENESOLA 250 W PV PANEL
250 WATT NOMINAL

Helen Kirk
617 Walnut Ave.
Charlotte, NC 28208
High Module Conversion Efficiencies

Easy Installation and Handling for Various Applications

Mechanical Load Capability of up to 113 psf (5400 Pa)

Conforms with IEC 61215:2005,
IEC 61730: 2004, UL 1703 PV Standards

ISO9001, OHSAS18001, ISO14001 Certified

Application Class A, Safety Class II, Fire Rating C

Also Applicable For Module With Black Frame

Guarantee

10-year Re-manufacturing
25-year Performance Figures in %
### Virtus® II Module

**Dimensions**
- 39.1 inches x 1.6 inches
- 37.4 inches x 33.9 inches

**Efficiency at Varied Irradiation**

<table>
<thead>
<tr>
<th>Irradiance (W/m²)</th>
<th>Efficiency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 W/m²</td>
<td>15.8%</td>
</tr>
<tr>
<td>400 W/m²</td>
<td>16.2%</td>
</tr>
<tr>
<td>600 W/m²</td>
<td>16.2%</td>
</tr>
<tr>
<td>800 W/m²</td>
<td>16.1%</td>
</tr>
<tr>
<td>1000 W/m²</td>
<td>16.0%</td>
</tr>
</tbody>
</table>

### Electrical Characteristics STC

<table>
<thead>
<tr>
<th></th>
<th>IC250M 24/88h</th>
<th>IC255M 24/88h</th>
<th>IC260M 24/88h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Power (Pmpp)</td>
<td>250 W</td>
<td>255 W</td>
<td>260 W</td>
</tr>
<tr>
<td>Power Tolerance</td>
<td>±±5 W</td>
<td>±±5 W</td>
<td>±±5 W</td>
</tr>
<tr>
<td>Module Efficiency</td>
<td>15.4%</td>
<td>15.7%</td>
<td>16.0%</td>
</tr>
<tr>
<td>Maximum Power Current (Imp)</td>
<td>8.31 A</td>
<td>8.39 A</td>
<td>8.53 A</td>
</tr>
<tr>
<td>Maximum Power Voltage (Vmp)</td>
<td>30.1 V</td>
<td>30.4 V</td>
<td>30.5 V</td>
</tr>
<tr>
<td>Short Circuit Current (Isc)</td>
<td>8.83 A</td>
<td>8.86 A</td>
<td>8.95 A</td>
</tr>
<tr>
<td>Open Circuit Voltage ( Voc)</td>
<td>37.4 V</td>
<td>37.5 V</td>
<td>37.6 V</td>
</tr>
</tbody>
</table>

Values at Standard Test Conditions STC (AM1.5, Irradiance 1000W/m², Cell Temperature 25°C)

### Electrical Characteristics NOCT

<table>
<thead>
<tr>
<th></th>
<th>IC250M 24/88h</th>
<th>IC255M 24/88h</th>
<th>IC260M 24/88h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Power (Pmpp)</td>
<td>185 W</td>
<td>189 W</td>
<td>193 W</td>
</tr>
<tr>
<td>Maximum Power Current (Imp)</td>
<td>6.67 A</td>
<td>6.63 A</td>
<td>6.74 A</td>
</tr>
<tr>
<td>Maximum Power Voltage (Vmp)</td>
<td>28.2 V</td>
<td>28.5 V</td>
<td>28.9 V</td>
</tr>
<tr>
<td>Short Circuit Current (Isc)</td>
<td>7.12 A</td>
<td>7.20 A</td>
<td>7.22 A</td>
</tr>
<tr>
<td>Open Circuit Voltage (Voc)</td>
<td>35.0 V</td>
<td>35.1 V</td>
<td>35.2 V</td>
</tr>
</tbody>
</table>

Values at Normal Operating Cell Temperature, Irradiance of 800W/m², AM1.5, Ambient Temperature 60°C, Wind Speed 1m/s.

### Mechanical Characteristics

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell Type</td>
<td>6 inches Virtus® II (Polycrystalline), 60 (6x10) pcs in series</td>
</tr>
<tr>
<td>Glass</td>
<td>High Transmission, Low Iron, Tempered Glass</td>
</tr>
<tr>
<td>Frame</td>
<td>Anodized Aluminum Alloy</td>
</tr>
<tr>
<td>Junction Box</td>
<td>IEC61730 Rated, With Bypass Diodes</td>
</tr>
<tr>
<td>Dimension</td>
<td>114.6 x 111.1 x 1.6 inches</td>
</tr>
<tr>
<td>Output Cable</td>
<td>12 AWG, 39.4 inches</td>
</tr>
<tr>
<td>Weight</td>
<td>41.9 lbs</td>
</tr>
<tr>
<td>Installation Hole Location</td>
<td>See Drawing Above</td>
</tr>
</tbody>
</table>

### Packing Information

<table>
<thead>
<tr>
<th>Container</th>
<th>20' GP</th>
<th>40' GP</th>
<th>40' HQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pallets per Container</td>
<td>12</td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td>Pieces per Container</td>
<td>300</td>
<td>700</td>
<td>700</td>
</tr>
</tbody>
</table>

**Maximum Ratings**

<table>
<thead>
<tr>
<th>Operating Temperature</th>
<th>-40°F → +185°F (-40°C → +85°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum System Voltage</td>
<td>1000VDC (U)</td>
</tr>
<tr>
<td>Maximum Series Fuse Rating</td>
<td>30A (U)</td>
</tr>
</tbody>
</table>
The Enphase® M215 Microinverter with integrated ground delivers increased energy harvest and reduces design and installation complexity with its all-AC approach. With the advanced M215, the DC circuit is isolated and insulated from ground, so no Ground Electrode Conductor (GEC) is required for the microinverter. This further simplifies installation, enhances safety, and saves on labor and materials costs.

The Enphase M215 integrates seamlessly with the Engage® Cable, the Envoy® Communications Gateway™, and Enlighten®, Enphase’s monitoring and analysis software.

**PRODUCTIVE**
- Maximizes energy production
- Minimizes impact of shading, dust, and debris
- No single point of system failure

**SIMPLE**
- No GEC needed for microinverter
- No DC design or string calculation required
- Easy installation with Engage Cable

**RELIABLE**
- More than 1 million hours of testing and millions of units shipped
- Industry-leading warranty, up to 25 years
<table>
<thead>
<tr>
<th><strong>INPUT DATA (DC)</strong></th>
<th><strong>M215-60-2LL-S22-IG / S23-IG / S24-IG</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommended input power (STC)</td>
<td>190 - 270 W</td>
</tr>
<tr>
<td>Maximum input DC voltage</td>
<td>48 V</td>
</tr>
<tr>
<td>Peak power tracking voltage</td>
<td>27 V - 39 V</td>
</tr>
<tr>
<td>Operating range</td>
<td>16 V - 48 V</td>
</tr>
<tr>
<td>Min/Max start voltage</td>
<td>22 V / 48 V</td>
</tr>
<tr>
<td>Max DC short circuit current</td>
<td>15 A</td>
</tr>
<tr>
<td>Max input current</td>
<td>10 A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>OUTPUT DATA (AC)</strong></th>
<th><strong>@208 VAC</strong></th>
<th><strong>@240 VAC</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak output power</td>
<td>225 W</td>
<td>225 W</td>
</tr>
<tr>
<td>Rated (continuous) output power</td>
<td>215 W</td>
<td>215 W</td>
</tr>
<tr>
<td>Nominal output current</td>
<td>1.1 A (A rms at nominal duration)</td>
<td>0.9 A (A rms at nominal duration)</td>
</tr>
<tr>
<td>Nominal voltage/range</td>
<td>208 V / 183-229 V</td>
<td>240 V / 211-264 V</td>
</tr>
<tr>
<td>Nominal frequency/range</td>
<td>60.0 / 57-61 Hz</td>
<td>60.0 / 57-61 Hz</td>
</tr>
<tr>
<td>Extended frequency range</td>
<td>57-62.5 Hz</td>
<td>57-62.5 Hz</td>
</tr>
<tr>
<td>Power factor</td>
<td>&gt;0.95</td>
<td>&gt;0.95</td>
</tr>
<tr>
<td>Maximum units per 20 A branch circuit</td>
<td>25 (three phase)</td>
<td>17 (single phase)</td>
</tr>
<tr>
<td>Maximum output fault current</td>
<td>850 mA rms for 6 cycles</td>
<td>850 mA rms for 6 cycles</td>
</tr>
</tbody>
</table>

**EFFICIENCY**
- CEC weighted efficiency, 240 VAC: 96.5%
- CEC weighted efficiency, 208 VAC: 96.5%
- Peak inverter efficiency: 96.5%
- Static MPPT efficiency (weighted, reference EN50530): 99.4%
- Night time power consumption: 65 mW max

**MECHANICAL DATA**
- Ambient temperature range: -40°C to +65°C
- Dimensions (WxHxD): 171 mm x 173 mm x 30 mm (without mounting bracket)
- Weight: 1.6 kg (3.4 lbs)
- Cooling: Natural convection - No fans
- Enclosure environmental rating: Outdoor - NEMA 6

**FEATURES**
- Compatibility: Compatible with 60-cell PV modules.
- Communication: Power line
- Integrated ground: The DC circuit meets the requirements for ungrounded PV arrays in NEC 690.35. Equipment ground is provided in the Engage Cable. No additional GEC or ground is required. Ground fault protection (GFP) is integrated into the microinverter.
- Monitoring: Enlighten Manager and MyEnlighten monitoring options
- Compliance: UL1741/IEEE1547, FCC Part 15 Class B, CAN/CSA-C22.2 NO. 0-M91, 0.4-04, and 107.1-01

* Frequency ranges can be extended beyond nominal if required by the utility.

To learn more about Enphase Microinverter technology, visit enphase.com
EZHelio® Composite Shingle Pitched Roof System

- Few components
- Easy to install
- Low price
- Optional rail splice for longer rows of rail
- Our Ez Roof Mount for composite shingles is simple, versatile and fast to install
- End and mid clamps designed for strength and thermal expansion
- The rail is heavy duty and comes in 4 different lengths

SUNMOO®
Component and Kits Detail

Helio Standard Rail
Kit #: A20144-xxx

Rail Splice Kit
Kit #: K10441-001 (3/8" rail slot)

40mm End Clamp Kit
Kit #: K10002-040

Mid Clamp Kit
Kit #: K10001-001

All kits come complete with the following parts:
1. Rail Splice Kit
2. Mid Clamp Kit
3. 1/4" Flange Nut
4. 4-40 Screws 1/4"-20 x 1/8" (2 each)
5. 4-40 Screws 1/4"-20 x 1/4" (4 each)
6. 4-40 Screws 1/4"-20 x 1/2" (2 each)
7. T Bolt 1/4"-20 x 1/2" (2 each)
8. 1/4"-20 x 1/4" (2 each)
9. 1/4"-20 x 1/2" (2 each)
10. 1/4"-20 x 1/4" (2 each)

All kits come complete with the following parts:
1. 1-1/4" Flange Nut
2. 4-40 Screws 1/4"-20 x 1/8" (2 each)
3. 4-40 Screws 1/4"-20 x 1/4" (4 each)
4. 4-40 Screws 1/4"-20 x 1/2" (2 each)
5. T Bolt 1/4"-20 x 1/2" (2 each)
6. 1/4"-20 x 1/4" (2 each)
7. 1/4"-20 x 1/2" (2 each)
8. 1/4"-20 x 1/4" (2 each)
How to determine the amount of racking and cost needed:

Sunmodo has taken out the guess work and provides you with an easy to understand matrix guide.

1. All you need to do is just count the number of rows you will need for your system.

2. Reference the rows needed by means of the matrix guide and you will know the exact parts list and cost.

Example:

This system will need:

- 1 Row of 3 panels
- 1 Row of 6 panels
- 3 Rows of 11 panels
# Composite Shingle System Chart

## How to use the chart:

1. Determine how many rows will be needed for each residential system.
2. Each row will give you the amount of parts needed and cost.
3. By adding up the parts from all the rows, you will get an overall list of parts needed and a total system cost.

## Components Needed

<table>
<thead>
<tr>
<th>Any panel up to wide</th>
<th>Sunmodo Part #</th>
<th>Ez Roof Mount</th>
<th>84&quot; Rail</th>
<th>124&quot; Rail</th>
<th>164&quot; Rail</th>
<th>206&quot; Rail</th>
<th>50mm End Clamp Kit</th>
<th>Mid Clamp Kit</th>
<th>3/8&quot; Rail Splice Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunmodo Part #</td>
<td>K10068-001</td>
<td>A20144-084</td>
<td>A20144-124</td>
<td>A20144-164</td>
<td>A20144-206</td>
<td>K10002-050</td>
<td>K10001-001</td>
<td>K10141-001</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel Row</th>
<th>2</th>
<th>4</th>
<th>2</th>
<th>4</th>
<th>2</th>
<th>4</th>
<th>2</th>
<th>4</th>
<th>2</th>
<th>4</th>
<th>2</th>
<th>4</th>
<th>2</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Panel Row</td>
<td>6</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>4 Panel Row</td>
<td>8</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>5 Panel Row</td>
<td>8</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
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</table>
STATE OF NORTH CAROLINA
BOARD OF EXAMINERS OF ELECTRICAL CONTRACTORS
THIS IS TO CERTIFY THAT:

Global Efficient Energy LLC

Qualifiers: Joel Donald Johnson

is duly registered and entitled to practice Electrical Contracting in the
Unlimited Classification
Limitation: Any project regardless of value

Global Efficient Energy LLC
2320 Gravel Road
Fort Worth, TX 76118

Witness our hands and seal of the Board

James W. Carpenter
Chairman

Jim Holman
Secretary-Treasurer
<table>
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<tr>
<th>2014-2015 CITY OF CHARLOTTE AND/OR MECKLENBURG COUNTY PRIVILEGE LICENSE</th>
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<tr>
<td>SUBJECT TO ORDINANCES IN FORCE OR HEREAFTER ENACTED, TO CONDUCT THE FOLLOWING BUSINESS.</td>
</tr>
<tr>
<td>105  ALL BUSINESS, TRADES, PROFESSIONS</td>
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<td>ACCOUNT NUMBER 0205255</td>
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<td>EXPIRES JUNE 30, 2015</td>
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<td>SPECIALIST LADORA CRUDUP</td>
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<td>LICENSE IS HEREBY GLOBAL EFFICIENT ENERGY LLC</td>
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<tr>
<td>GRANTED: 4121 ROSE LAKE DR STE 4121-A</td>
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<td>CHARLOTTE, NC 28217</td>
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<td>TAX COLLECTOR</td>
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<td>POST IN A CONSPICUOUS PLACE</td>
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<td>GS 105-366 (d) (1) (a) requires notification to the Tax Collector 48 hours prior to going out of business, the transfer of or pending sale to another party. DO NOT REPRODUCE, DOCUMENT VOID IF NOT DUAL COLOR PRINT</td>
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NOT TRANSFERABLE
Example: Picture of 4 solar panels attached to a rooftop
Example: Picture of 4 Solar Panels attached to a rooftop