



# Solar Energy Data Analysis and Predictive Modeling: A Case Study On Open Data, KSA.

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Predictive analysis

DHI Analysis

DNI Analysis

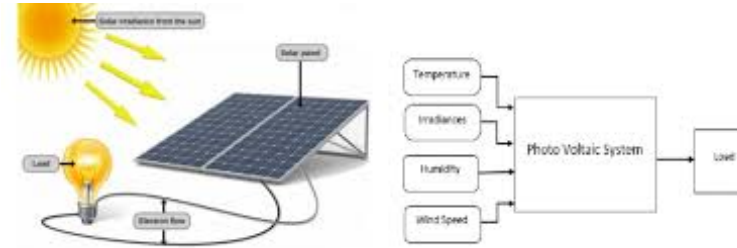
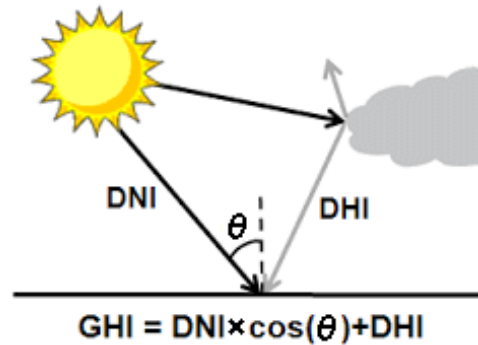
GHI Analysis

Meteorological Impact

GHI plots

Key Influences1

Key Influences2



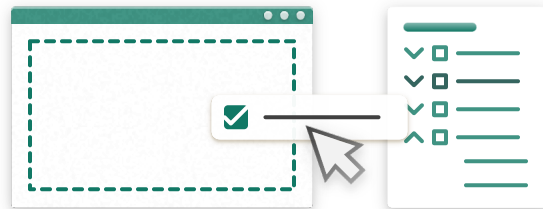
$$E_t = DNI \cdot \cos(\theta_i) + DHI \cdot (1 + \cos(\beta))/2 + GHI \cdot \rho_g \cdot (1 - \cos(\beta))/2$$



Site	Year	Quarter	Month	Day	Sum of DHI (Wh/m2)	Sum of DNI (Wh/m2)	Sum of GHI (Wh/m2)	Sum of A
Al Baha - University	2019	Qtr 1	January	5	2,730.50	4,082.40	5,895.80	
Al Baha - University	2019	Qtr 1	January	6	2,752.90	4,397.70	6,252.50	
Al Baha - University	2019	Qtr 1	January	7	2,950.10	4,929.20	6,914.60	
Al Baha - University	2019	Qtr 1	January	8	2,624.20	4,751.70	6,362.00	
Al Baha - University	2019	Qtr 1	January	9	2,286.30	6,008.30	6,709.80	
Al Baha - University	2019	Qtr 1	January	10	1,698.90	6,532.60	6,017.50	
Al Baha - University	2019	Qtr 1	January	11	1,546.00	5,047.10	4,554.20	
Al Baha - University	2019	Qtr 1	January	12	1,302.90	6,612.50	4,915.20	
Al Baha - University	2020	Qtr 1	January	1	1,087.90	7,888.50	5,450.10	
Al Baha - University	2020	Qtr 1	January	2	1,902.60	6,379.00	5,930.50	
Al Baha - University	2020	Qtr 1	January	3	2,099.50	6,879.20	6,950.00	
Total					1,986,007.85	5,008,132.93	5,352,690.62	

## Build visuals with your data

Select or drag fields from the **Data** pane onto the report canvas.





Site  
All

Date  
All

Air Temper...  
All

Barometric Press...  
All

Relative Humidity ...  
All

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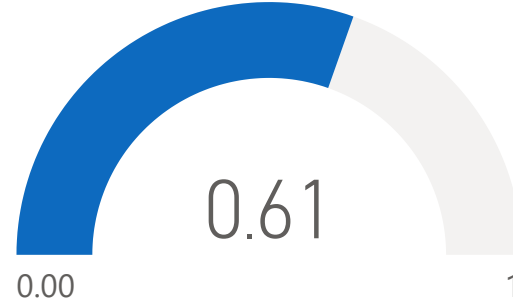
Meterological Impact

GHI plots

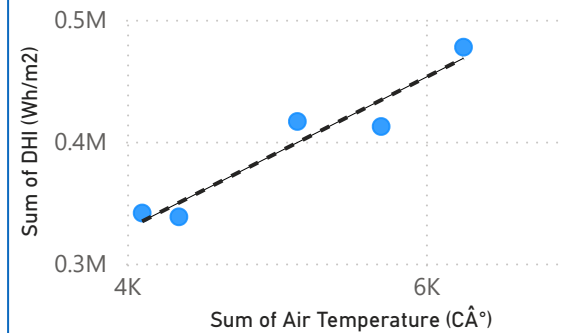
Key Influences1

Key Influences2

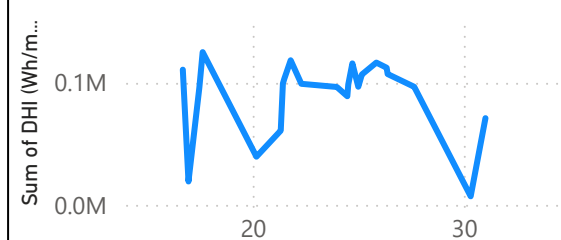
Corr :AT vs DHI and Max



Sum of Air Temperature (CÂ°) and Sum of DHI (Wh/m2) by Year



Sum of DHI (Wh/m2) by Latitude



Key influencers Top segments

What influences DHI (Wh/m2) to Increase

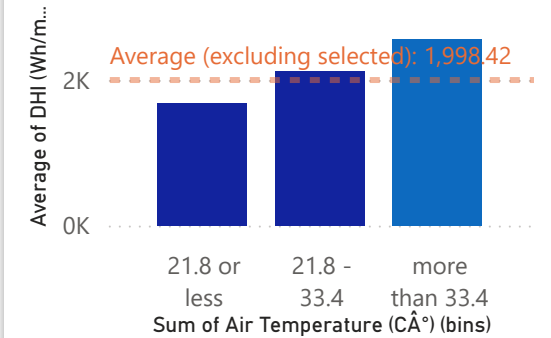
When...

Sum of Air Temperature (CÂ°) is more than 33.4

...the average of DHI (Wh/m2) increases by

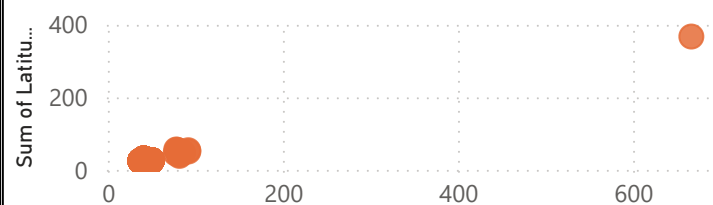
559

DHI (Wh/m2) is more likely to increase when Sum of Air Temperature (CÂ°) is more than 33.4 than otherwise (on average).

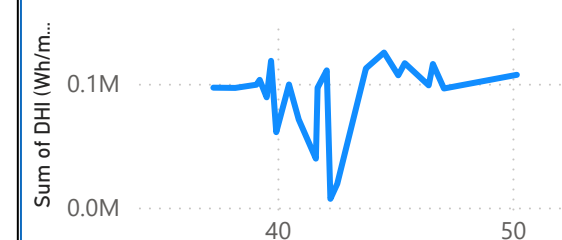


Only show values that are influencers

Sum of Longitude and Sum of Latitude by DHI (Wh/m2)



Sum of DHI (Wh/m2) by Longitude





Site  
Arar - TVTC

Date  
All

Air Temper...  
All

Barometric Press...  
All

Relative Humidity ...  
All

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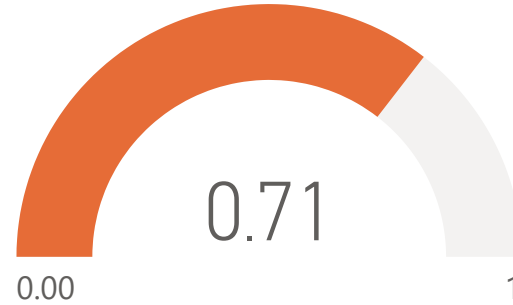
Meterological Impact

GHI plots

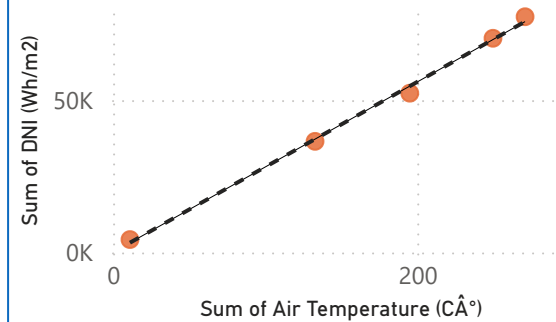
Key Influences1

Key Influences2

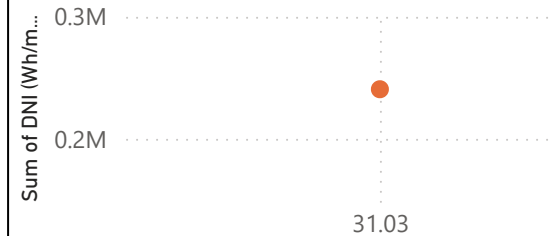
Corr:: DNI vs AT and Max



Sum of Air Temperature (CÂ°) and Sum of DNI (Wh/m2) by Year



DHI (Wh/m2) by Latitude



Key influencers Top segments

What influences DNI (Wh/m2) to Increase ?

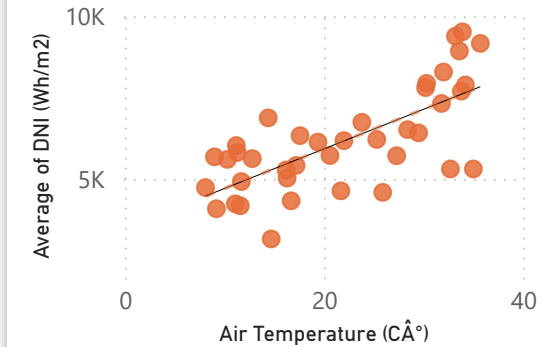
When...

Sum of Air Temperature (CÂ°) goes up 9.08

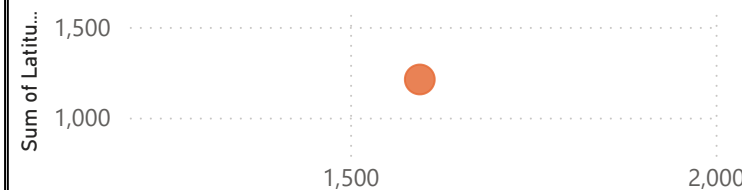
...the average of DNI (Wh/m2) increases by

396.3

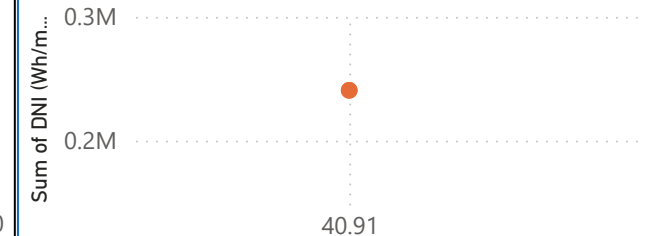
← On average when Sum of Air Temperature (CÂ°) increases, DNI (Wh/m2) also increases.



Sum of Longitude, Sum of Latitude and Sum of DNI (Wh/m2)



DNI (Wh/m2) by Longitude





Site  
All

Date  
All

Air Temper...  
All

Barometric Press...  
All

Relative Humidity ...  
All

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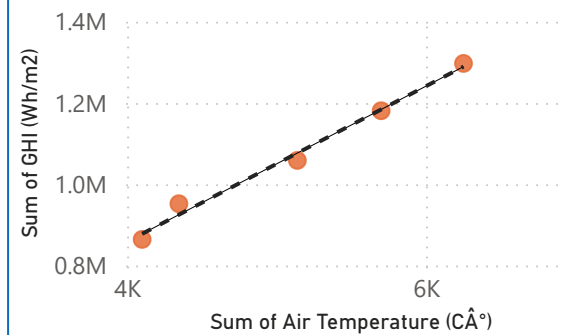
Key Influences1

Key Influences2

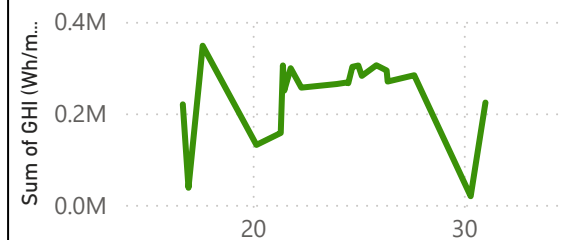
## Corr:GHI vs AT and Max



## Sum of Air Temperature (CÂ°) and Sum of GHI (Wh/m2) by Year



## DHI (Wh/m2) by Latitude



## Key influencers Top segments

What influences GHI (Wh/m2) to Increase ?

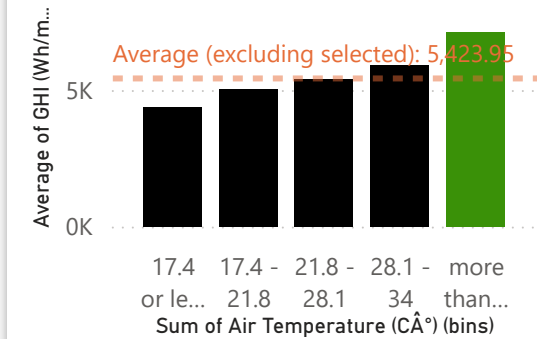
When...

Sum of Air Temperature (CÂ°) is more than 34

...the average of GHI (Wh/m2) increases by

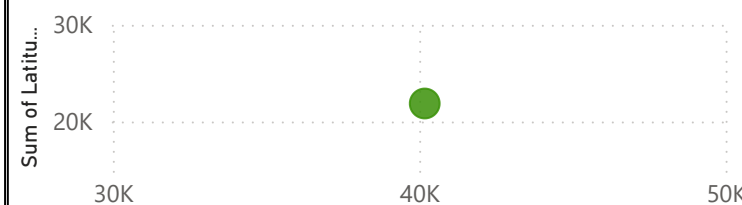
1.7K

← GHI (Wh/m2) is more likely to increase when Sum of Air Temperature (CÂ°) is more than 34 than otherwise (on average).

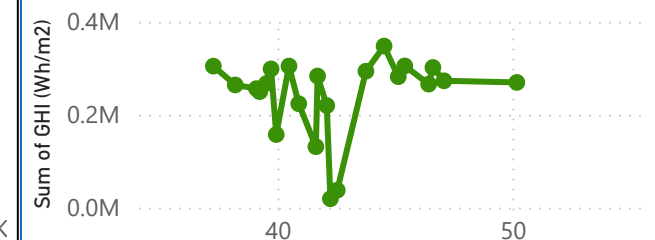


☐ Only show values that are influencers

## Sum of Longitude, Sum of Latitude and Sum of DNI (Wh/m2)



## DNI (Wh/m2) by Longitude





Site  
All

Date  
All

Air Temperature (CÂ°)  
5.40 40.00

Barometric Pressure (mB (...)  
5.00 1,018.00

Relative Humidity (%)  
3.00 95.90

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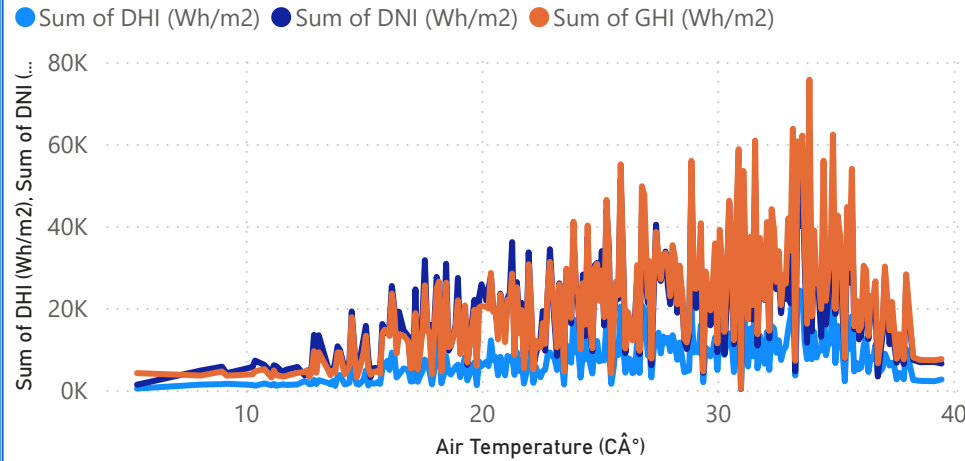
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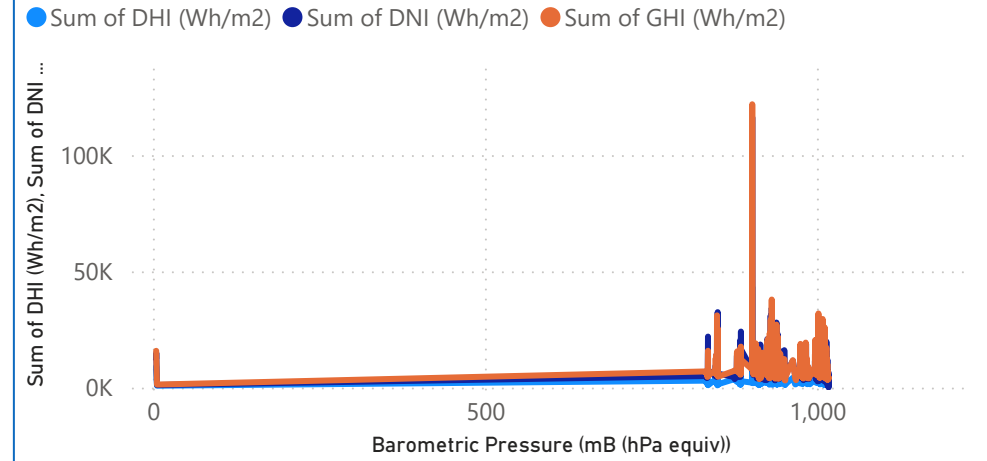
Key Influences1

Key Influences2

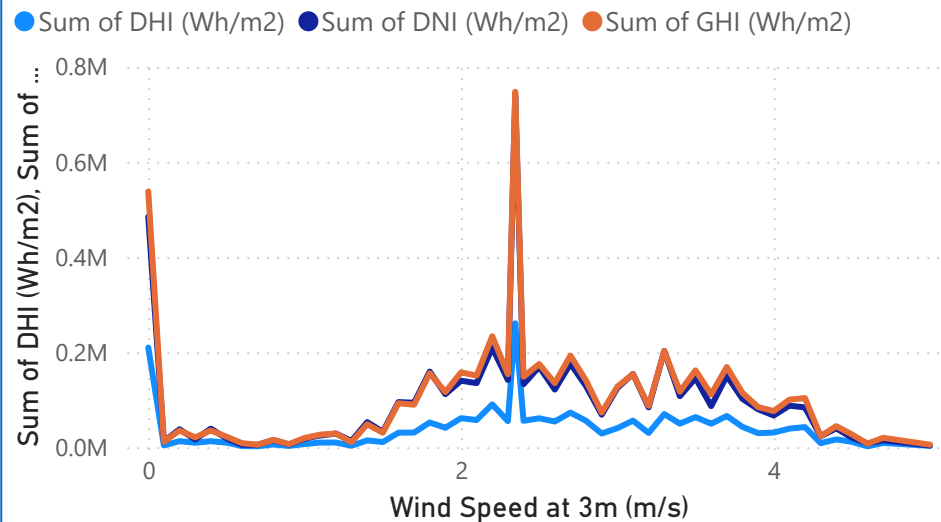
### Impact of Air Temperature on DHI, DNI and GHI



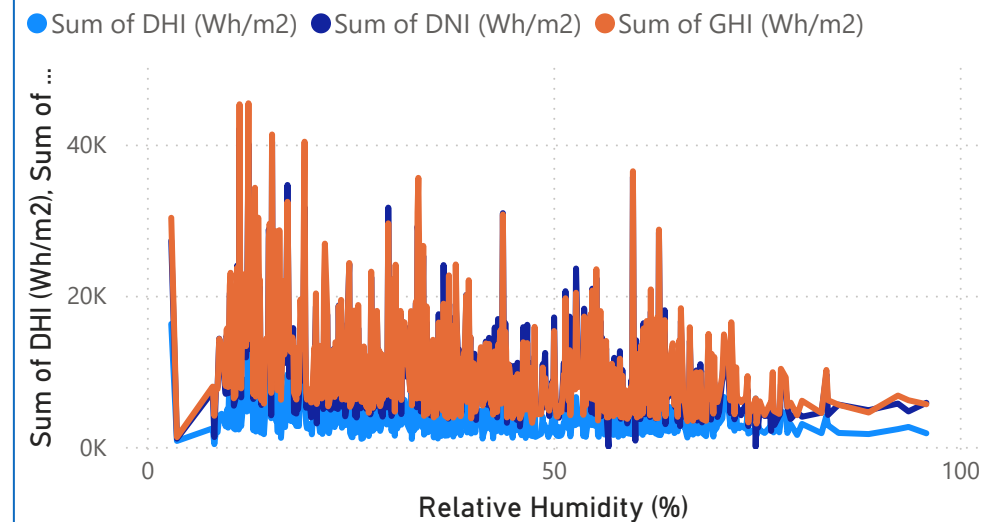
### Impact of Baraometric pressure on DHI, DNI and GHI

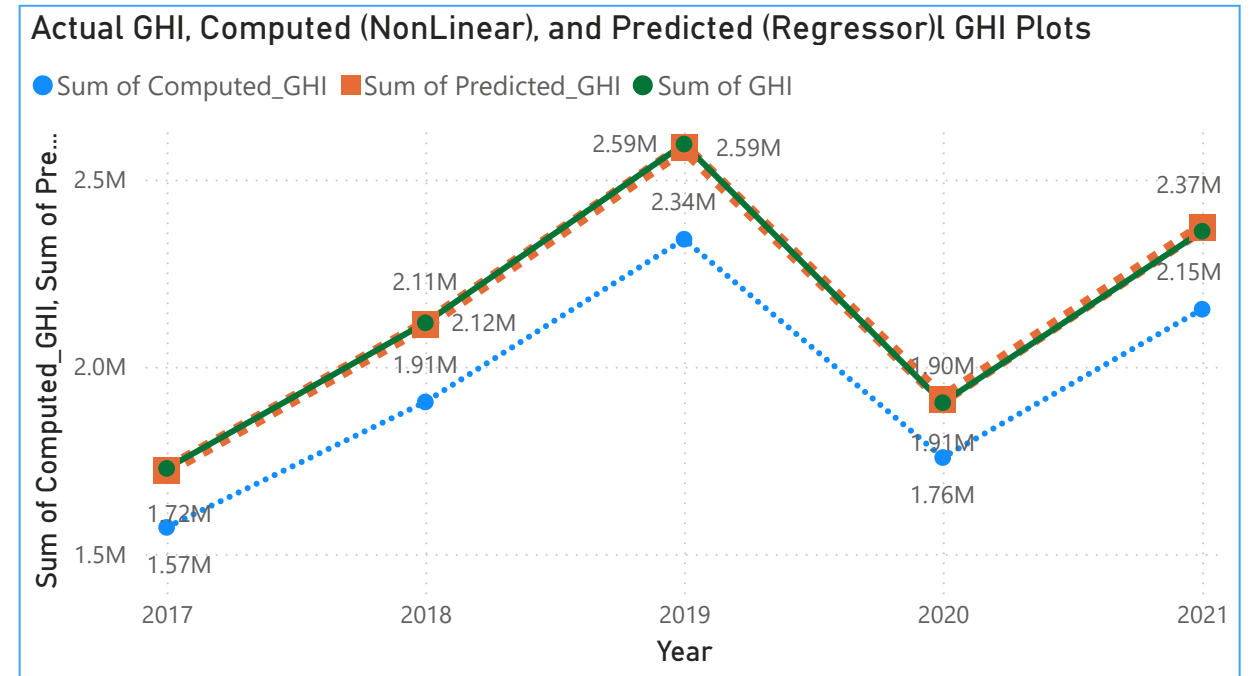
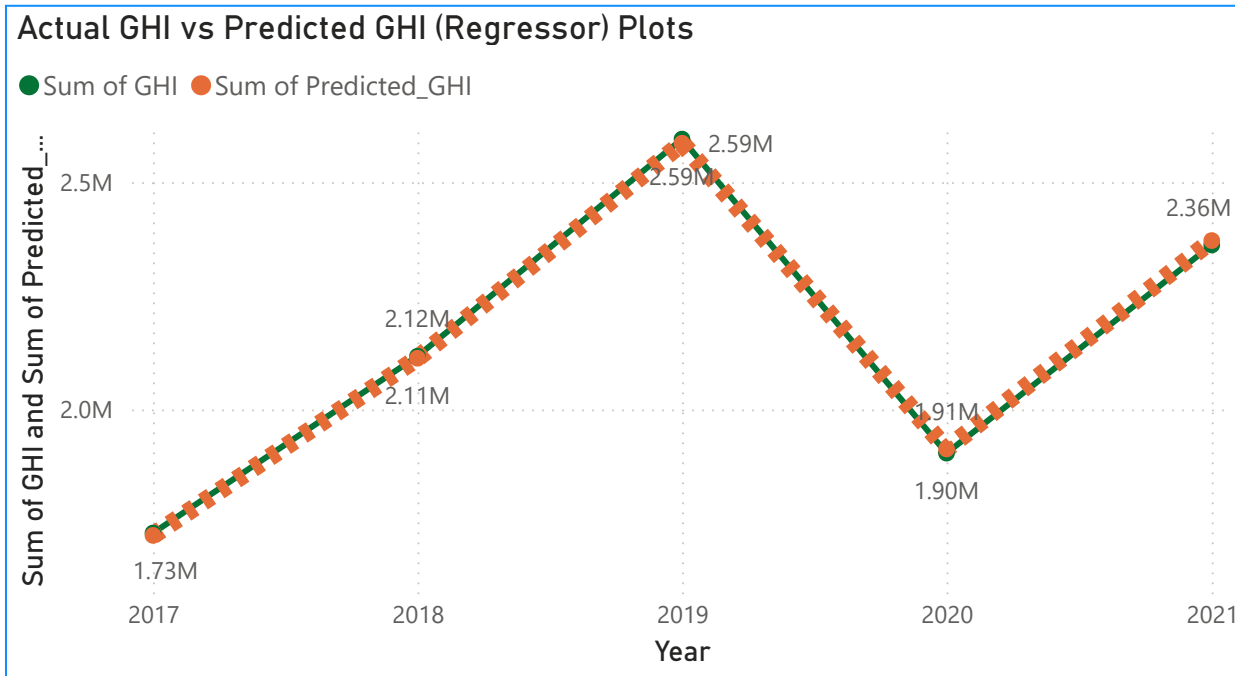
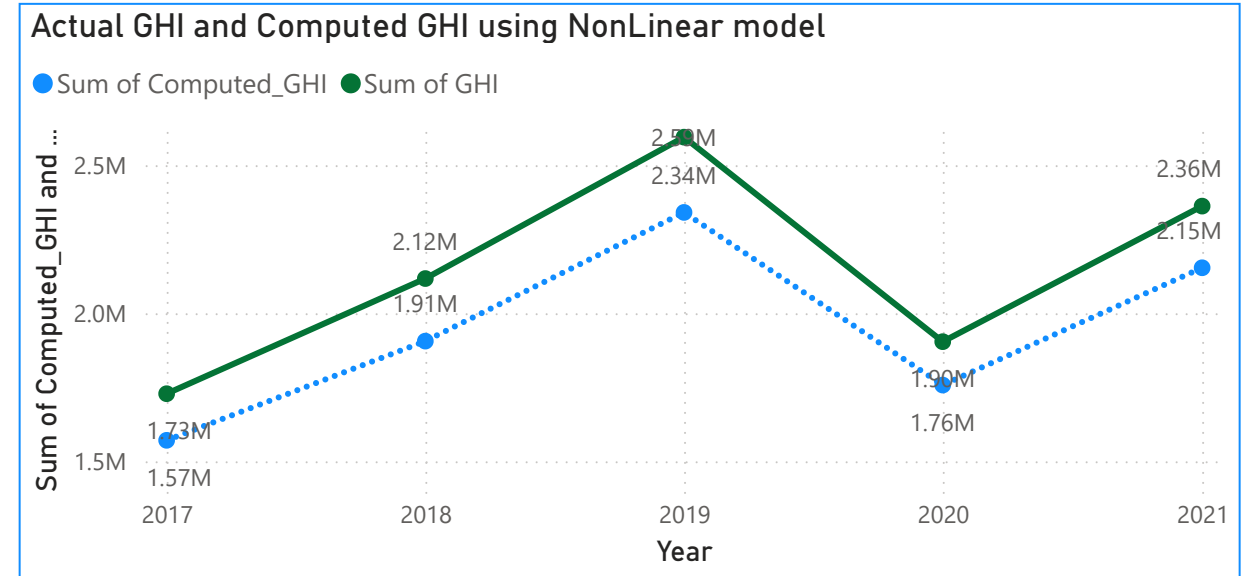
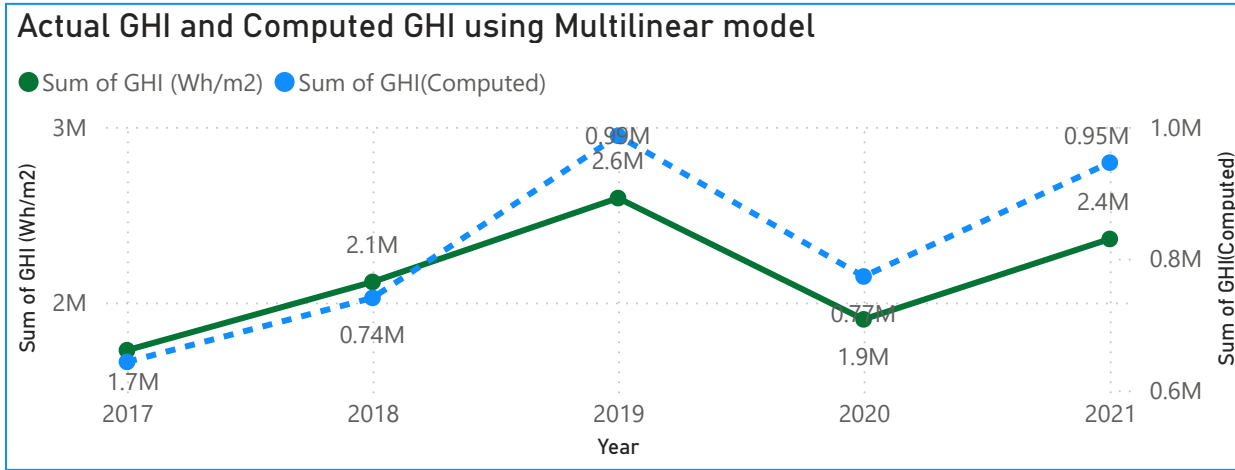


### Impact of Wind Speed on DHI, DNI and GHI



### Impact of Relative humidity on DHI, DNI and GHI







Site  
All

Date  
All

Air Temperature (CÂ°)  
5.40 40.00

Barometric Pressure (mB (hPa ...  
5.00 1,018.00

Relative Humidity (%)  
3.00 95.90

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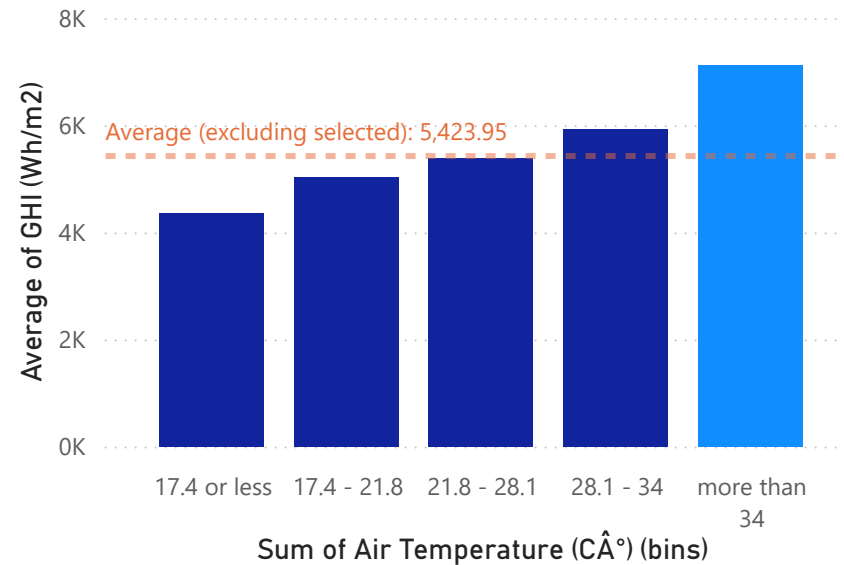
Key Influences2

## Key influencers Top segments

What influences GHI (Wh/m2) to Increase ?

Sum of Air Temperature (...) 1.7K

← GHI (Wh/m2) is more likely to increase when Sum of Air Temperature (CÂ°) is more than 34 than otherwise (on average).



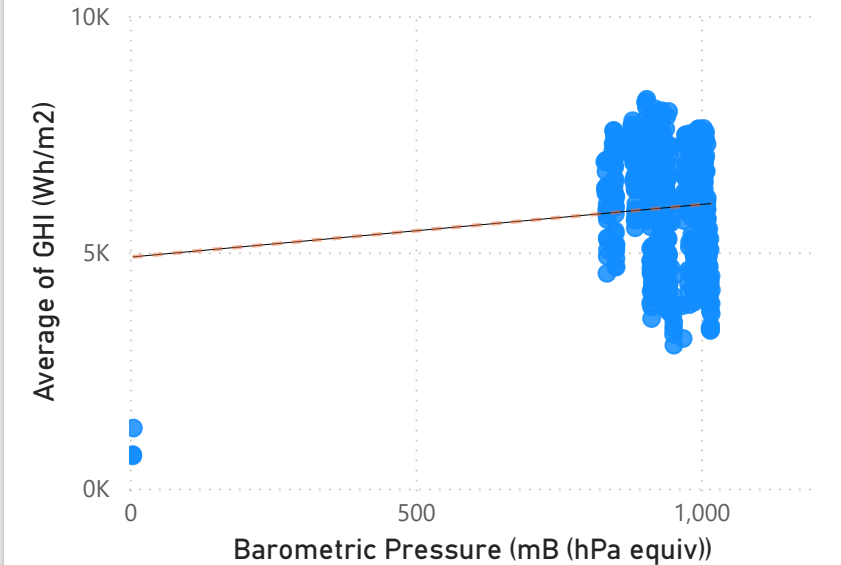
☐ Only show values that are influencers

## Key influencers Top segments

What influences GHI (Wh/m2) to Increase ?

Sum of Barometric Pressu... 1.03K

← On average when Sum of Barometric Pressure (mB (hPa equiv)) increases, GHI (Wh/m2) also increases.







Site

All

Date

All

Air Temperature (CÂ°)

5.40

40.00

Barometric Pressure (mB (...)

5.00

1,018.00

Relative Humidity (%)

3.00

95.90

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Key Influences2

## Key influencers Top segments



What influences GHI (Wh/m2) to  ?

When...

....the average of GHI (Wh/m2) increases by

Sum of Relative Humidity (%) is 3.7 - 21.9

1.83K

Sum of Relative Humidity (%) is 21.9 - 35.2

572.4

## Key influencers Top segments



What influences DHI (Wh/m2) to  ?

When...

....the average of DHI (Wh/m2) increases by

Sum of Wind Speed at 3m (m/s) is more than 3.5

417.5



Key  
Influences

ali.kadampur@gmail.com

Site  
All

Date  
All

Air Temperature (C/F)

5.40 40.00

Barometric Pressure (mB)

5.00 1,018.00

Relative Humidity (%)

3.00 95.90

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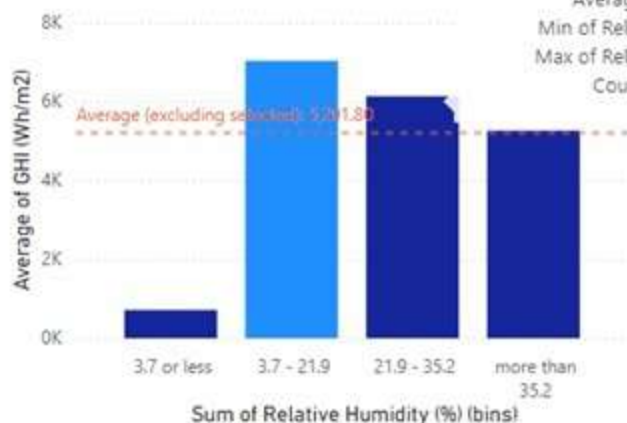
### Key influencers Top segments

What influences GHI (Wh/m2) to Increase ?

Sum of Relative Humidity...

1.83K

GHI (Wh/m2) is more likely to increase when Sum of Relative Humidity (%) is less than 21.9 than otherwise (on average).



☐ Only show values that are influencers

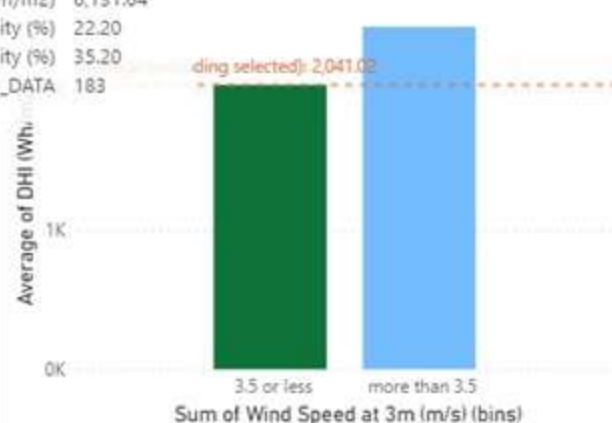
### Key influencers Top segments

What influences DHI (Wh/m2) to Increase ?

Sum of Wind Speed at 3m...

417.5

DHI (Wh/m2) is more likely to increase when Sum of Wind Speed at 3m (m/s) is less than 3.5 than otherwise (on average).



☐ Only show values that are influencers