In [1]:
```
import pandas as pd
import numpy as np
from sklearn import preprocessing
import matplotlib.pyplot as plt
import seaborn as sns
sns.set(style="white")#white background for seaborn plots
sns.set(style="whitegrid",color_codes=True)
import warnings
warnings.simplefilter(action="ignore")
```

In [2]:
```
df=pd.read_csv(r"C:\Users\P. VIJAY KUMAR\Downloads\used_cars_data.csv")
df
```

Out[2]:

	S.No.	Name	Location	Year	Kilometers_Driven	Fuel_Type	Transmission	Owner_Type	Mileage	Engine	P
0	0	Maruti Wagon R LXI CNG	Mumbai	2010	72000	CNG	Manual	First	26.6 km/kg	998 CC	
1	1	Hyundai Creta 1.6 CRDi SX Option	Pune	2015	41000	Diesel	Manual	First	19.67 kmpl	1582 CC	
2	2	Honda Jazz V	Chennai	2011	46000	Petrol	Manual	First	18.2 kmpl	1199 CC	
3	3	Maruti Ertiga VDI	Chennai	2012	87000	Diesel	Manual	First	20.77 kmpl	1248 CC	
4	4	Audi A4 New 2.0 TDI Multitronic	Coimbatore	2013	40670	Diesel	Automatic	Second	15.2 kmpl	1968 CC	
...	...	...	...	...	...	...	...	...	...	...	
7248	7248	Volkswagen Vento Diesel Trendline	Hyderabad	2011	89411	Diesel	Manual	First	20.54 kmpl	1598 CC	
7249	7249	Volkswagen Polo GT TSI	Mumbai	2015	59000	Petrol	Automatic	First	17.21 kmpl	1197 CC	
7250	7250	Nissan Micra Diesel XV	Kolkata	2012	28000	Diesel	Manual	First	23.08 kmpl	1461 CC	
7251	7251	Volkswagen Polo GT TSI	Pune	2013	52262	Petrol	Automatic	Third	17.2 kmpl	1197 CC	
7252	7252	Mercedes-Benz E-Class 2009-2013 E 220 CDI Avan...	Kochi	2014	72443	Diesel	Automatic	First	10.0 kmpl	2148 CC	

7253 rows × 14 columns

In [3]:
```
1 df.head()
```

Out[3]:

	S.No.	Name	Location	Year	Kilometers_Driven	Fuel_Type	Transmission	Owner_Type	Mileage	Engine	Power
0	0	Maruti Wagon R LXI CNG	Mumbai	2010	72000	CNG	Manual	First	26.6 km/kg	998 CC	58.16 bhp
1	1	Hyundai Creta 1.6 CRDi SX Option	Pune	2015	41000	Diesel	Manual	First	19.67 kmpl	1582 CC	126.2 bhp
2	2	Honda Jazz V	Chennai	2011	46000	Petrol	Manual	First	18.2 kmpl	1199 CC	88.7 bhp
3	3	Maruti Ertiga VDI	Chennai	2012	87000	Diesel	Manual	First	20.77 kmpl	1248 CC	88.76 bhp
4	4	Audi A4 New 2.0 TDI Multitronic	Coimbatore	2013	40670	Diesel	Automatic	Second	15.2 kmpl	1968 CC	140.8 bhp

In [4]:
```
1 df.shape
```

Out[4]: (7253, 14)

In [5]:
```
1 df.describe()
```

Out[5]:

	S.No.	Year	Kilometers_Driven	Seats	Price
count	7253.000000	7253.000000	7.253000e+03	7200.000000	6019.000000
mean	3626.000000	2013.365366	5.869906e+04	5.279722	9.479468
std	2093.905084	3.254421	8.442772e+04	0.811660	11.187917
min	0.000000	1996.000000	1.710000e+02	0.000000	0.440000
25%	1813.000000	2011.000000	3.400000e+04	5.000000	3.500000
50%	3626.000000	2014.000000	5.341600e+04	5.000000	5.640000
75%	5439.000000	2016.000000	7.300000e+04	5.000000	9.950000
max	7252.000000	2019.000000	6.500000e+06	10.000000	160.000000

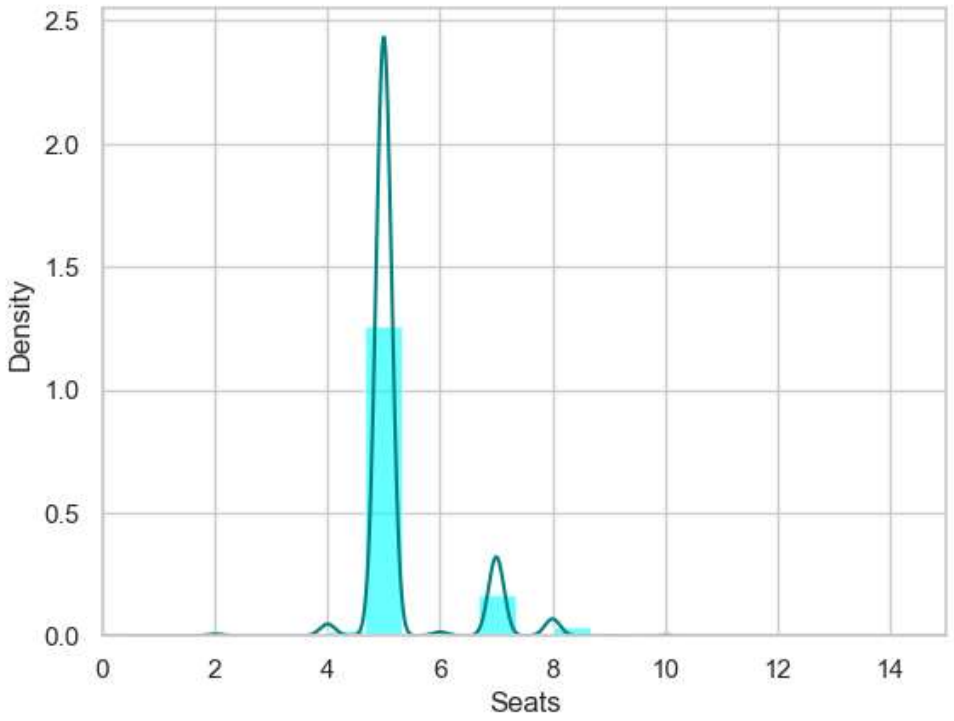
In [6]:
```
1 df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 7253 entries, 0 to 7252
Data columns (total 14 columns):
 #   Column             Non-Null Count  Dtype  
---  ------             --------------  -----  
 0   S.No.              7253 non-null   int64  
 1   Name               7253 non-null   object 
 2   Location           7253 non-null   object 
 3   Year               7253 non-null   int64  
 4   Kilometers_Driven  7253 non-null   int64  
 5   Fuel_Type          7253 non-null   object 
 6   Transmission       7253 non-null   object 
 7   Owner_Type         7253 non-null   object 
 8   Mileage            7251 non-null   object 
 9   Engine             7207 non-null   object 
 10  Power              7207 non-null   object 
 11  Seats              7200 non-null   float64
 12  New_Price          1006 non-null   object 
 13  Price              6019 non-null   float64
dtypes: float64(2), int64(3), object(9)
memory usage: 793.4+ KB
```

In [7]:
```
1 df.isnull().sum()
```

Out[7]:
```
S.No.                  0
Name                   0
Location               0
Year                   0
Kilometers_Driven      0
Fuel_Type              0
Transmission           0
Owner_Type             0
Mileage                2
Engine                46
Power                 46
Seats                 53
New_Price           6247
Price               1234
dtype: int64
```

In [8]:
```
ax = df["Seats"].hist(bins=15, density=True, stacked=True, color='cyan', alpha=0.6)
df["Seats"].plot(kind='density', color='teal')
ax.set(xlabel='Seats')
plt.xlim(-0,15)
plt.show()
```



In [9]:
```
print(df["Seats"].mean(skipna=True))
print(df["Seats"].median(skipna=True))
```

```
5.279722222222222
5.0
```

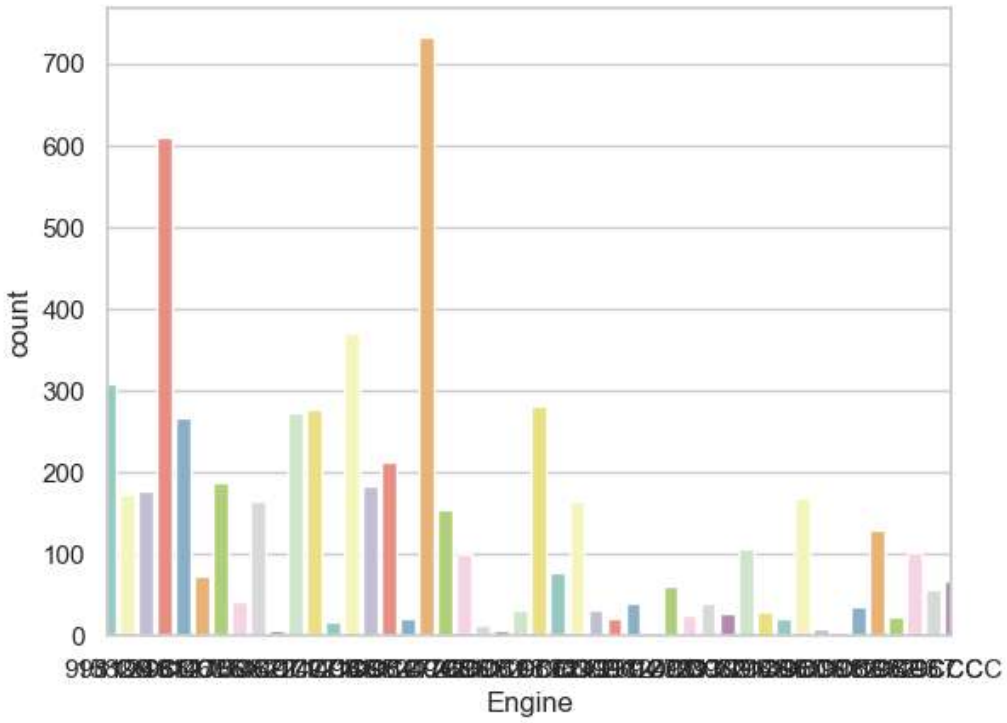
In [10]:
```
print(df["New_Price"].isnull().sum()/df.shape[0]*100)
print(df["Price"].isnull().sum()/df.shape[0]*100)
print(df["Mileage"].isnull().sum()/df.shape[0]*100)
print(df["Engine"].isnull().sum()/df.shape[0]*100)
print(df["Power"].isnull().sum()/df.shape[0]*100)
```

```
86.12987729215497
17.01364952433476
0.02757479663587481
0.6342203226251206
0.6342203226251206
```

In [11]:
```
print(df["Engine"].value_counts())
sns.countplot(x='Engine',data=df,palette='Set3')
plt.xlim(-0,45)
plt.show()

```

```
Engine
1197 CC    732
1248 CC    610
1498 CC    370
998 CC     309
1198 CC    281
          ...
1489 CC      1
1422 CC      1
2706 CC      1
1978 CC      1
1389 CC      1
Name: count, Length: 150, dtype: int64
```



In [12]:
```
data=df.copy()
data['Seats'].fillna(df['Seats'].median(skipna=True),inplace=True)
data.drop('New_Price',axis=1,inplace=True)
data['Price'].fillna(df['Price'].median(skipna=True),inplace=True)
data['Mileage'].fillna(df['Mileage'].value_counts(),inplace=True)
data.drop('Engine',axis=1,inplace=True)
data.drop('Power',axis=1,inplace=True)

```

In [13]:
```
1 data.isnull().sum()
```

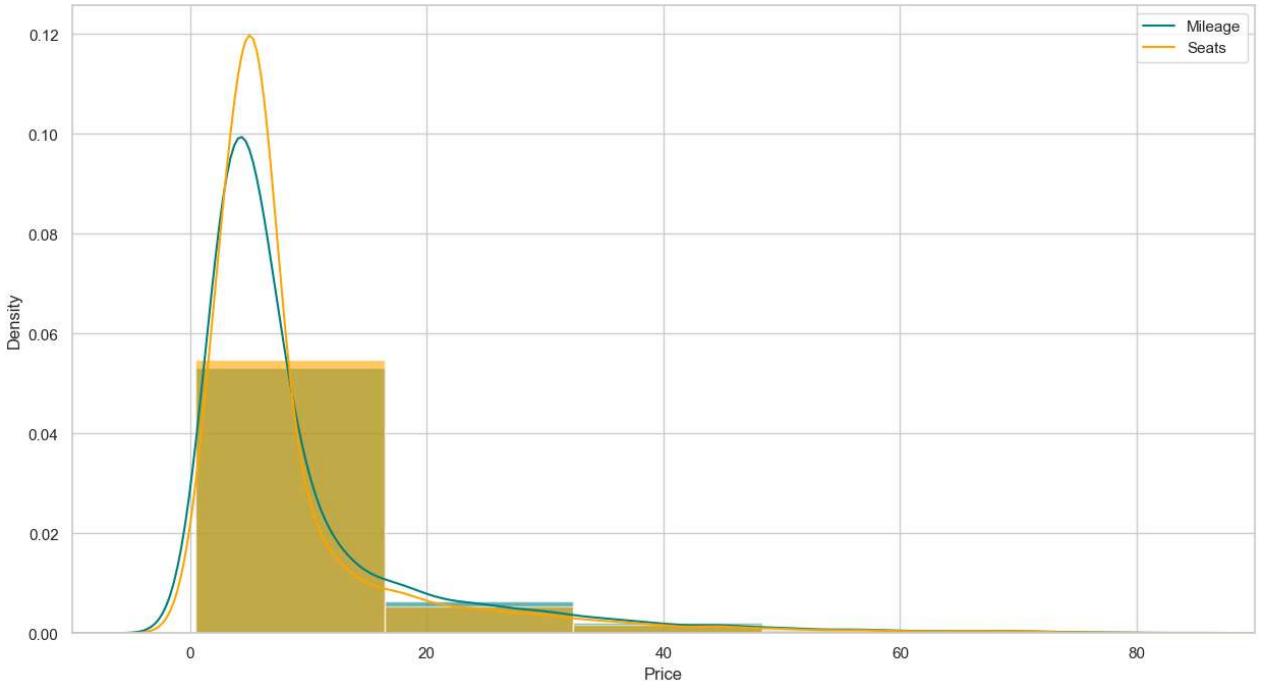
Out[13]:
```
S.No.                0
Name                 0
Location             0
Year                 0
Kilometers_Driven    0
Fuel_Type            0
Transmission         0
Owner_Type           0
Mileage              2
Seats                0
Price                0
dtype: int64
```

In [14]:
```
1 data.head()
```

Out[14]:

	S.No.	Name	Location	Year	Kilometers_Driven	Fuel_Type	Transmission	Owner_Type	Mileage	Seats	Price
0	0	Maruti Wagon R LXI CNG	Mumbai	2010	72000	CNG	Manual	First	26.6 km/kg	5.0	1.75
1	1	Hyundai Creta 1.6 CRDi SX Option	Pune	2015	41000	Diesel	Manual	First	19.67 kmpl	5.0	12.50
2	2	Honda Jazz V	Chennai	2011	46000	Petrol	Manual	First	18.2 kmpl	5.0	4.50
3	3	Maruti Ertiga VDI	Chennai	2012	87000	Diesel	Manual	First	20.77 kmpl	7.0	6.00
4	4	Audi A4 New 2.0 TDI Multitronic	Coimbatore	2013	40670	Diesel	Automatic	Second	15.2 kmpl	5.0	17.74

In [15]:
```
plt.figure(figsize=(15,8))
ax=df["Price"].hist(bins=10,density=True,stacked=True,color='teal',alpha=0.6)
df["Price"].plot(kind='density',color='teal')
ax=data["Price"].hist(bins=10,density=True,stacked=True,color='orange',alpha=0.6)
data["Price"].plot(kind='density',color='orange')
ax.legend(['Mileage','Seats'])
ax.set(xlabel='Price')
plt.xlim(-10,90)
plt.show()
```



In [16]:
```
training=pd.get_dummies(data,columns=["S.No."])
final_train=training
final_train.head()
```

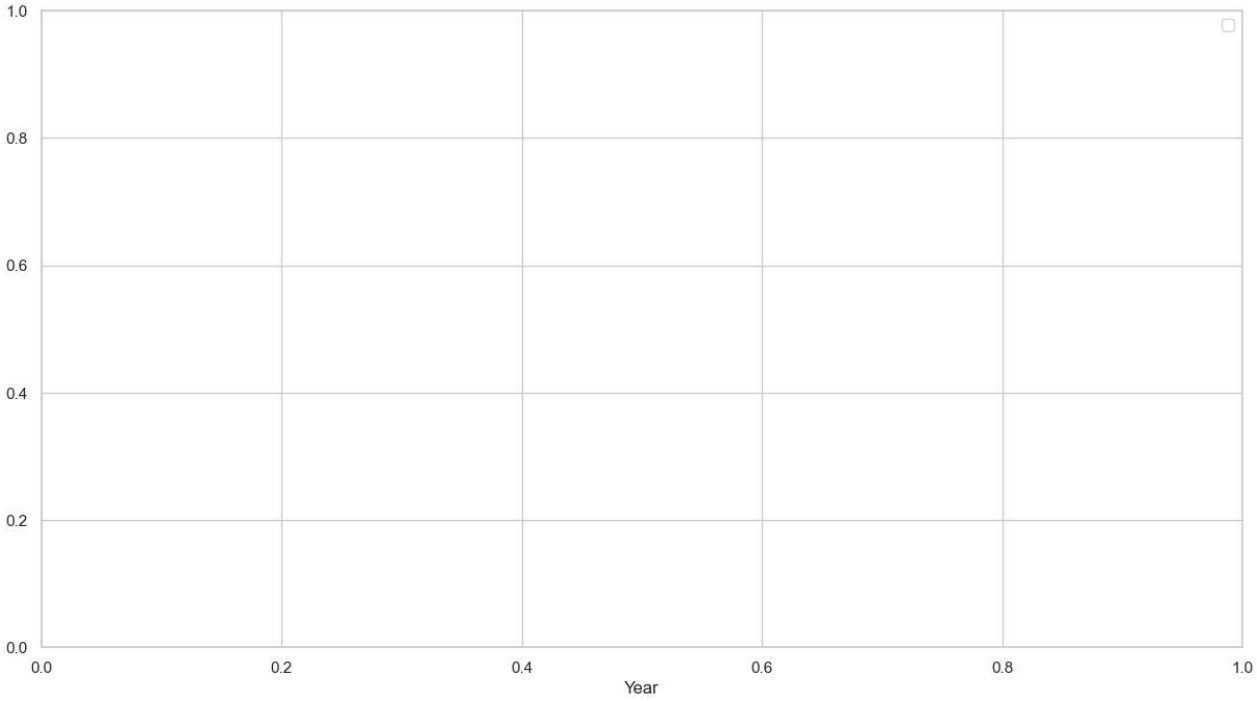
Out[16]:

	Name	Location	Year	Kilometers_Driven	Fuel_Type	Transmission	Owner_Type	Mileage	Seats	Price	...	S.No
0	Maruti Wagon R LXI CNG	Mumbai	2010	72000	CNG	Manual	First	26.6 km/kg	5.0	1.75	...	
1	Hyundai Creta 1.6 CRDi SX Option	Pune	2015	41000	Diesel	Manual	First	19.67 kmpl	5.0	12.50	...	
2	Honda Jazz V	Chennai	2011	46000	Petrol	Manual	First	18.2 kmpl	5.0	4.50	...	
3	Maruti Ertiga VDI	Chennai	2012	87000	Diesel	Manual	First	20.77 kmpl	7.0	6.00	...	
4	Audi A4 New 2.0 TDI Multitronic	Coimbatore	2013	40670	Diesel	Automatic	Second	15.2 kmpl	5.0	17.74	...	

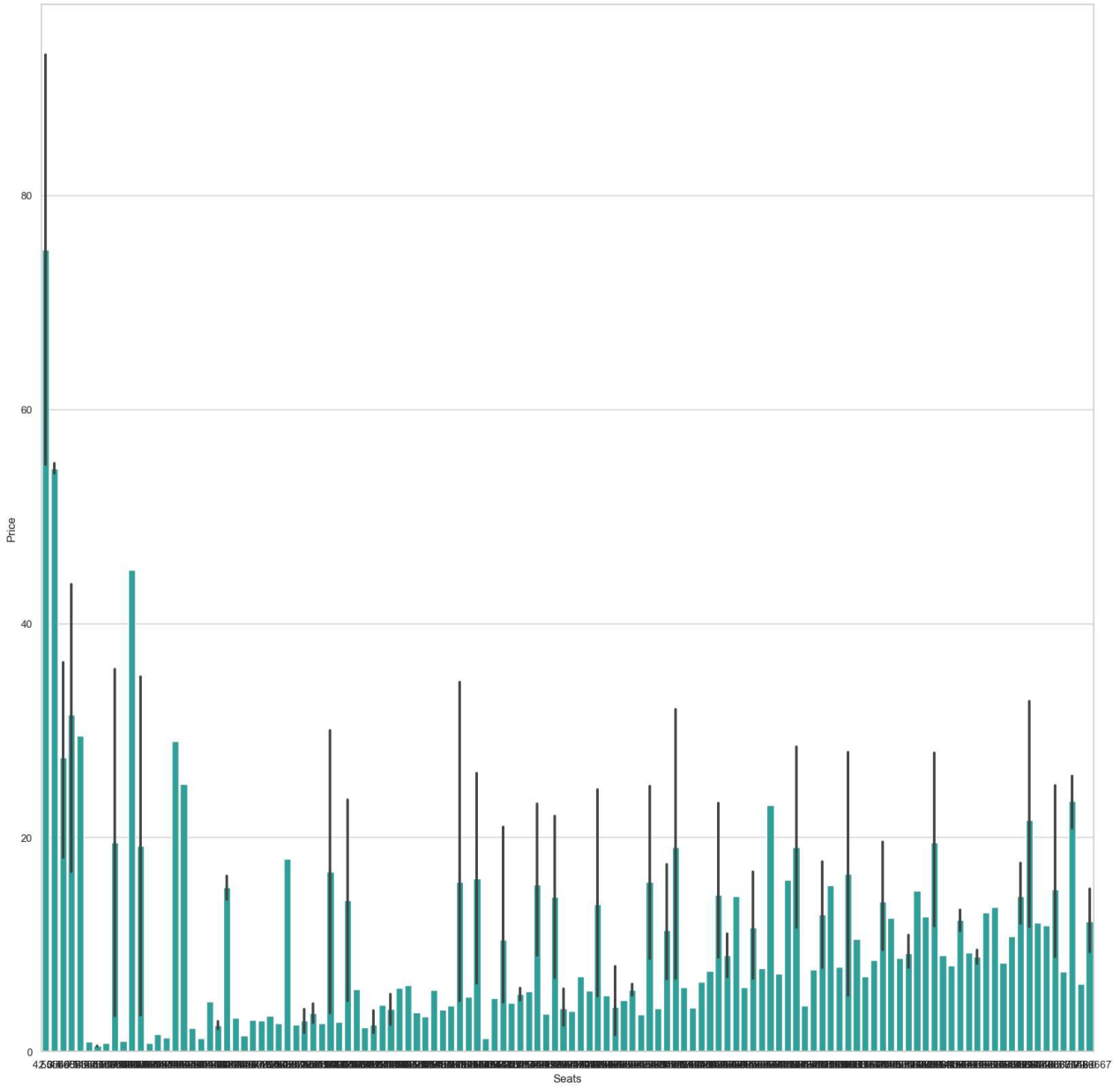
5 rows × 7263 columns

In [17]:
```
plt.figure(figsize=(15,8))
ax=sns.kdeplot(final_train["Price"][final_train.Year==1],color='darkturquoise',alpha=0.6)
sns.kdeplot(final_train["Kilometers_Driven"][final_train.Year==0],color="lightgreen",alpha=0.
plt.legend(['Cars','density'])
ax.set(xlabel='Year')
```

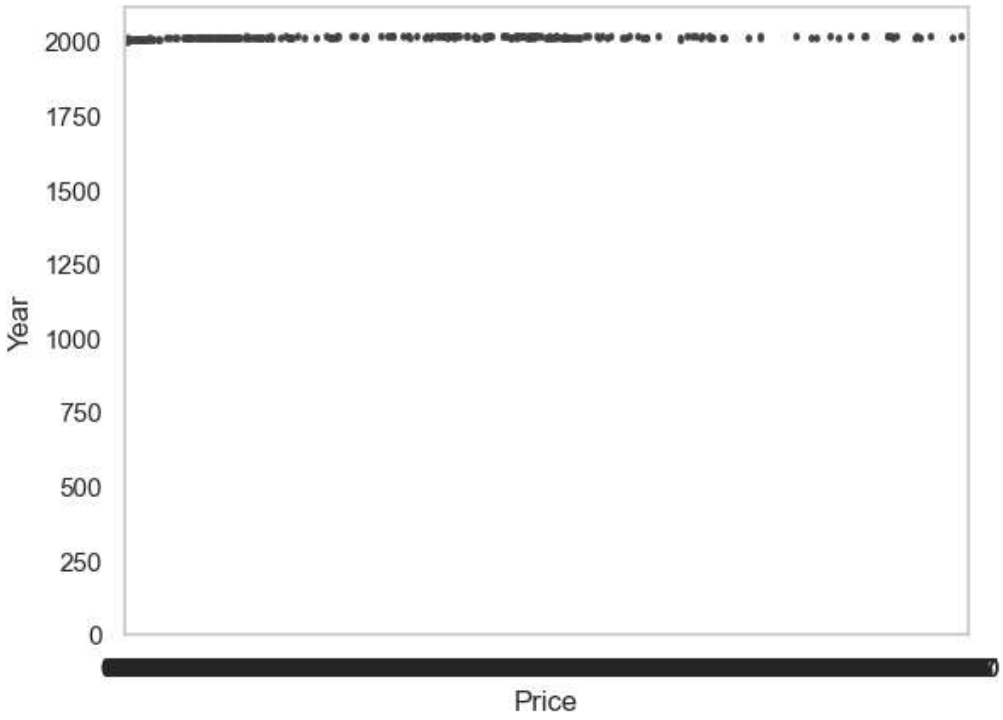
Out[17]: [Text(0.5, 0, 'Year')]



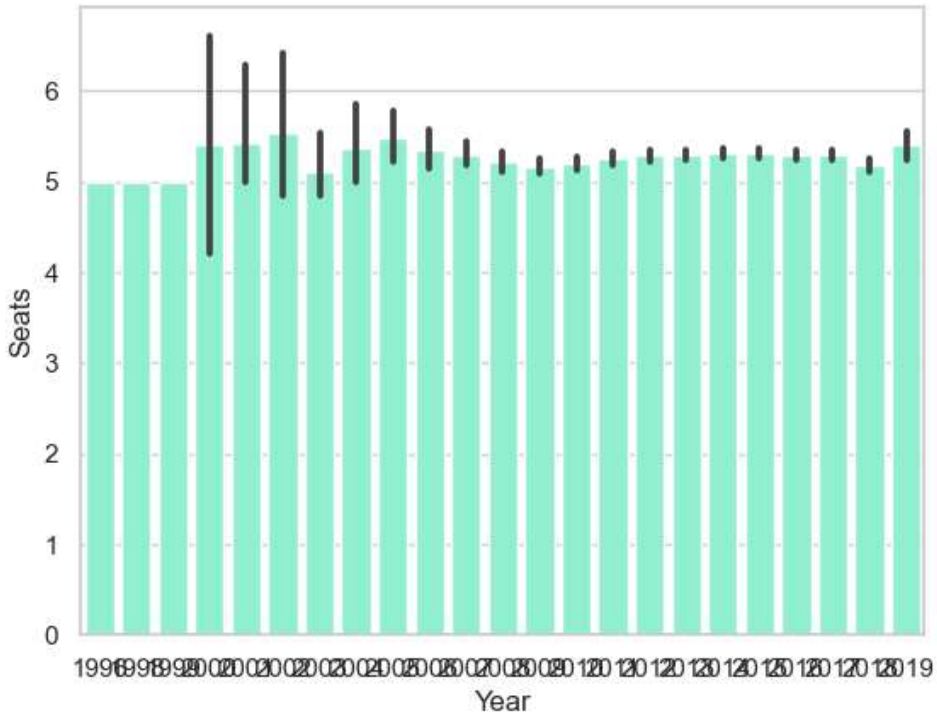
In [23]:
```
plt.figure(figsize=(20,20))
avg_survival_byage=final_train[['Seats','Price']].groupby(['Price'],as_index=False).mean()
g=sns.barplot(x='Seats',y='Price',data=avg_survival_byage,color="LightSeaGreen")
plt.show()
```



In [24]:
```
sns.barplot(x='Price',y='Year',data=final_train,color="mediumturquoise")
plt.show()
```



In [25]:
```
import seaborn as sns
import matplotlib.pyplot as plt
sns.barplot(x='Year',y='Seats',data=df,color='aquamarine')
plt.show()
```



In [ ]:
```
1
```