

PART- 3 (Handling Outliers)

In [1]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from scipy import stats
from scipy.stats.mstats import winsorize

import warnings
warnings.filterwarnings('ignore')
warnings.warn("this will not show")

%matplotlib inline
# %matplotlib notebook

plt.rcParams["figure.figsize"] = (10,6)
# plt.rcParams['figure.dpi'] = 100

sns.set_style("whitegrid")
pd.set_option('display.float_format', lambda x: '%.2f' % x)

pd.options.display.max_rows = 1000
pd.options.display.max_columns = 150
```

In [2]:

```
df = pd.read_csv("filled_scout.csv")
```

functions to fill the missing values

In [3]:

```
def fill_most(df, group_col, col_name):
    '''Fills the missing values with the most existing value (mode) in the relevant column according to single-
    for group in list(df[group_col].unique()):
        cond = df[group_col]==group
        mode = list(df[cond][col_name].mode())
        if mode != []:
            df.loc[cond, col_name] = df.loc[cond, col_name].fillna(df[cond][col_name].mode()[0])
        else:
            df.loc[cond, col_name] = df.loc[cond, col_name].fillna(df[col_name].mode()[0])
    print("Number of NaN : ", df[col_name].isnull().sum())
    print("-----")
    print(df[col_name].value_counts(dropna=False))
```

In [4]:

```
def fill_prop(df, group_col, col_name):
    for group in list(df[group_col].unique()):
        cond = df[group_col]==group
        df.loc[cond, col_name] = df.loc[cond, col_name].fillna(method="ffill").fillna(method="bfill")
    df[col_name] = df[col_name].fillna(method="ffill").fillna(method="bfill")
    print("Number of NaN : ", df[col_name].isnull().sum())
    print("-----")
    print(df[col_name].value_counts(dropna=False))
```

In [5]:

```
def fill(df, group_col1, group_col2, col_name, method): # method can be "mode" or "median" or "ffill"
    if method == "mode":
        for group1 in list(df[group_col1].unique()):
            for group2 in list(df[group_col2].unique()):
                cond1 = df[group_col1]==group1
                cond2 = (df[group_col1]==group1) & (df[group_col2]==group2)
                mode1 = list(df[cond1][col_name].mode())
                mode2 = list(df[cond2][col_name].mode())
                if mode2 != []:
                    df.loc[cond2, col_name] = df.loc[cond2, col_name].fillna(df[cond2][col_name].mode()[0])
                elif mode1 != []:
                    df.loc[cond2, col_name] = df.loc[cond2, col_name].fillna(df[cond1][col_name].mode()[0])
                else:
```

```

df.loc[cond2, col_name] = df.loc[cond2, col_name].fillna(df[col_name].mode()[0])

elif method == "median":
    for group1 in list(df[group_col1].unique()):
        for group2 in list(df[group_col2].unique()):
            cond1 = df[group_col1]==group1
            cond2 = (df[group_col1]==group1) & (df[group_col2]==group2)
            df.loc[cond2, col_name] = df.loc[cond2, col_name].fillna(df[cond2][col_name].median()).fillna(df[cond2][col_name].median())

elif method == "ffill":
    for group1 in list(df[group_col1].unique()):
        for group2 in list(df[group_col2].unique()):
            cond2 = (df[group_col1]==group1) & (df[group_col2]==group2)
            df.loc[cond2, col_name] = df.loc[cond2, col_name].fillna(method="ffill").fillna(method="bfill")

    for group1 in list(df[group_col1].unique()):
        cond1 = df[group_col1]==group1
        df.loc[cond1, col_name] = df.loc[cond1, col_name].fillna(method="ffill").fillna(method="bfill")

    df[col_name] = df[col_name].fillna(method="ffill").fillna(method="bfill")

print("Number of NaN : ", df[col_name].isnull().sum())
print("-----")
print(df[col_name].value_counts(dropna=False))

```

In [6]: df.shape

Out[6]: (15919, 29)

In [7]: df.head(1).T

	0
make_model	Audi A1
body_type	Sedans
price	15770
vat	VAT deductible
km	NaN
registration	2016-01-01
Type	Used
Fuel	Diesel
Emission Label	NaN
Gears	7.00
Comfort_Convenience	Air conditioning,Armrest,Automatic climate con...
Entertainment_Media	Bluetooth,Hands-free equipment,On-board comput...
Extras	Alloy wheels,Catalytic Converter,Voice Control
Safety_Security	ABS,Central door lock,Daytime running lights,D...
age	3.00
Previous_Owners	2.00
hp_kW	66.00
Type1	Used
Inspection_new	1
Paint_Type	Metallic
Upholstery_type	Cloth
Nr_of_Doors	5.00
Nr_of_Seats	5.00
Gearing_Type	Automatic

	0
Displacement_cc	1422.00
Weight_kg	1220.00
Drive_chain	front
cons_comb	3.80
CO2_Emission	99.00

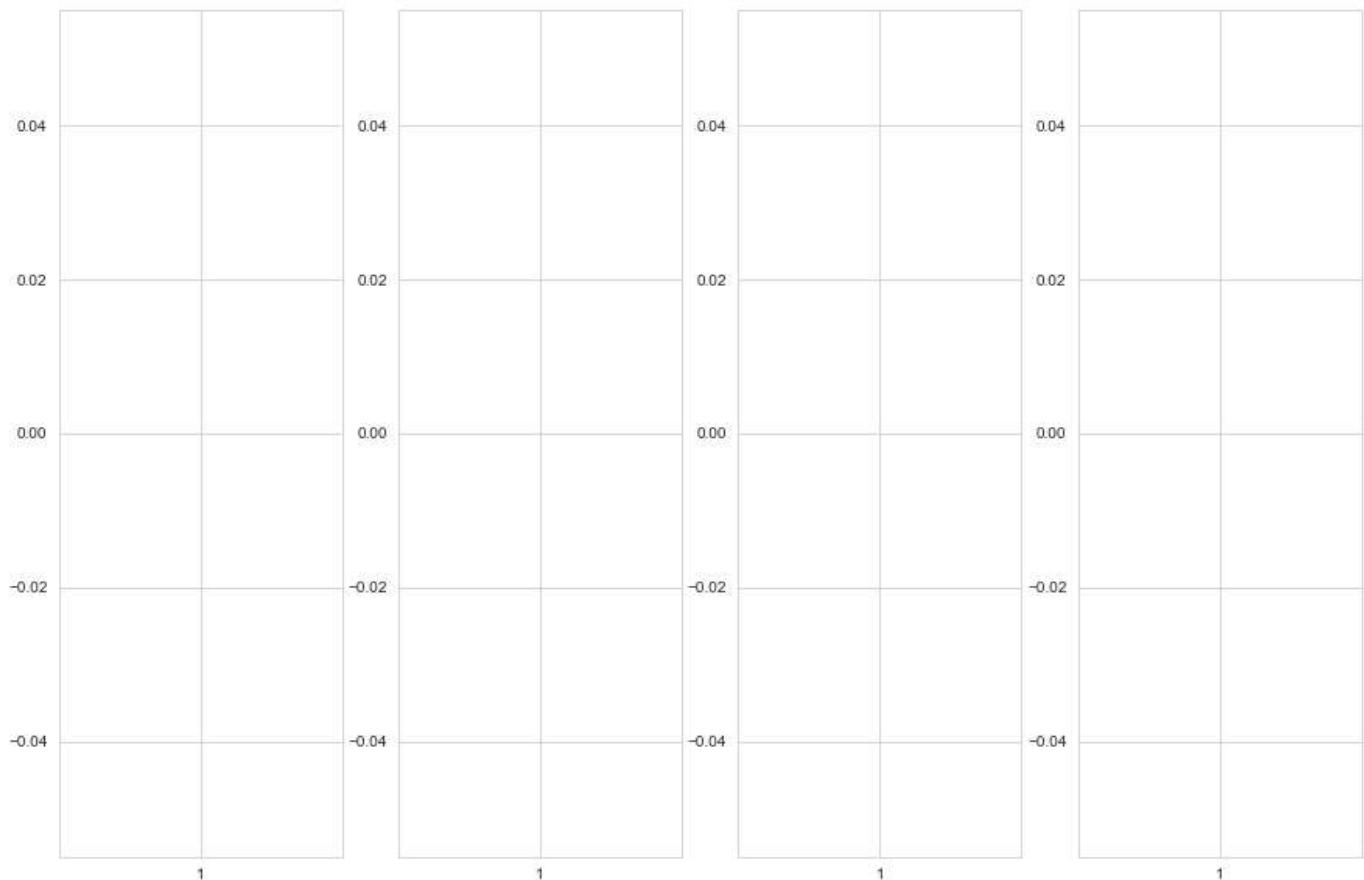
km

```
In [18]: plt.figure(figsize=(15,10))
plt.subplot(141)
plt.boxplot(df.km)
```

```
plt.subplot(142)
plt.boxplot(df.km)
```

```
plt.subplot(143)
plt.boxplot(df.km, whis = 2.5)
```

```
plt.subplot(144)
plt.boxplot(np.log(df.km), whis = 2.5)
plt.show()
```



```
In [ ]: #df["km_Logged"] = np.Log(df.km)
```

cons_comb

```
In [10]: df.cons_comb.describe()
```

```
Out[10]: count    15919.00
mean      4.83
std       0.87
```

```
min      3.00
25%     4.10
50%     4.80
75%     5.40
max     9.10
Name: cons_comb, dtype: float64
```

```
In [11]: df.cons_comb.sort_values().head(10)
```

```
Out[11]: 6440    3.00
2863    3.00
2862    3.00
13493   3.00
13482   3.00
11004   3.00
11015   3.00
11044   3.00
811     3.00
6240    3.00
Name: cons_comb, dtype: float64
```

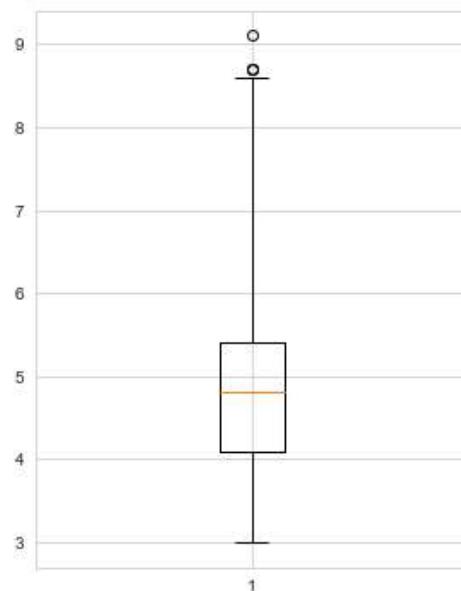
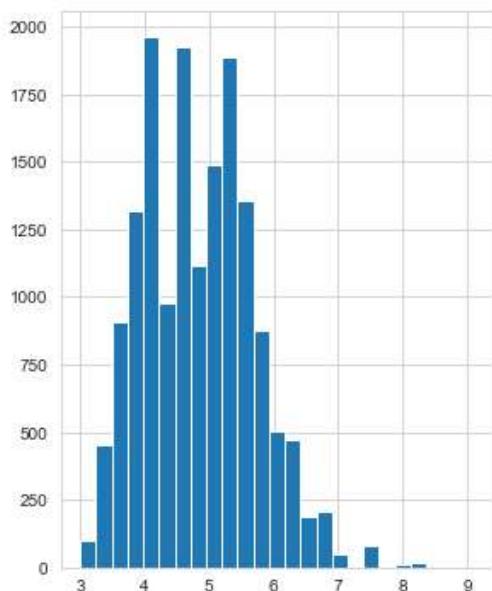
```
In [12]: df.cons_comb.sort_values().tail(10)
```

```
Out[12]: 3601    8.30
3649    8.30
10789   8.60
12553   8.60
12530   8.60
12422   8.60
10817   8.70
12054   8.70
12529   8.70
10771   9.10
Name: cons_comb, dtype: float64
```

```
In [13]: plt.figure(figsize = (10, 6))
plt.subplot(121)
plt.hist(df.cons_comb, bins = 25)

plt.subplot(122)
plt.boxplot(df.cons_comb, whis = 2.5)

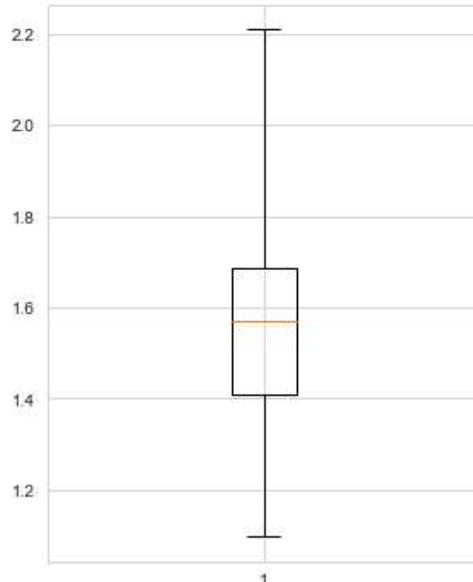
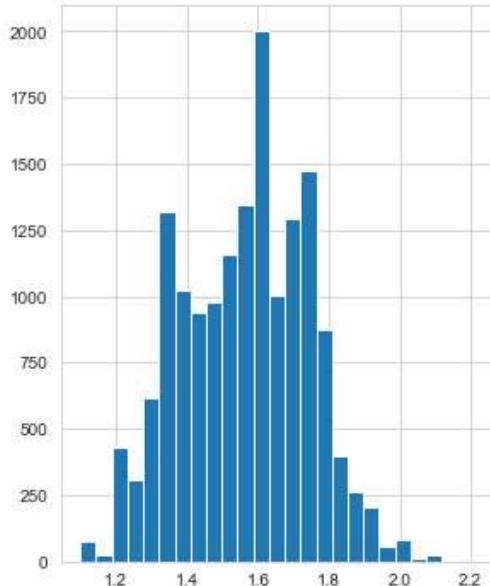
plt.show()
```



```
In [14]: plt.figure(figsize = (10, 6))
plt.subplot(121)
plt.hist(np.log(df.cons_comb), bins = 25)

plt.subplot(122)
plt.boxplot(np.log(df.cons_comb), whis = 2)
```

```
plt.show()
```

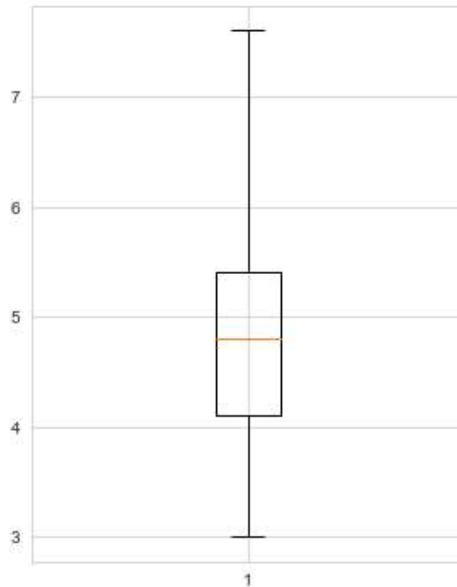
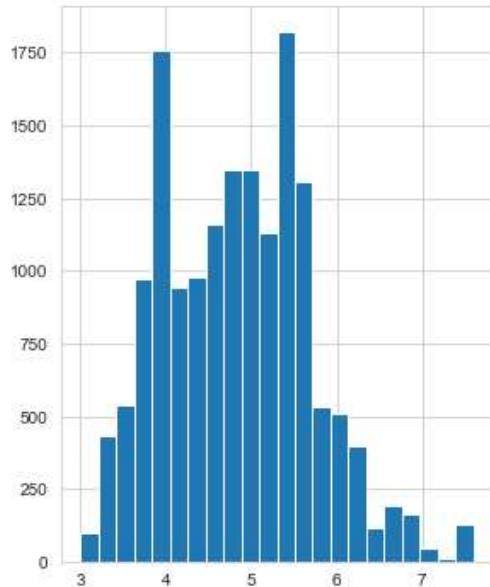


In [15]:

```
plt.figure(figsize = (10, 6))
plt.subplot(121)
plt.hist(winsorize(df.cons_comb, (0.003)), bins = 22)

plt.subplot(122)
plt.boxplot(winsorize(df.cons_comb, (0.003)), whis = 2)

plt.show()
```



displacement_cc

In [19]:

```
df.Displacement_cc.describe()
```

Out[19]:

	count	mean	std	min	25%	50%	75%	max
Name:	Displacement_cc	dtype: float64						
count	15919.00							
mean	1425.61							
std	329.72							
min	1.00							
25%	1229.00							
50%	1461.00							
75%	1598.00							
max	16000.00							

In [20]:

```
df.sort_values(by = ["Displacement_cc"], ascending = False)[["Displacement_cc"]].head(55)
```

Out[20]:

10932	16000.00
-------	----------

```
7169    15898.00
10771   2967.00
3595    2480.00
3587    2480.00
3649    2480.00
3590    2480.00
3599    2480.00
3598    2480.00
3596    2480.00
3600    2480.00
3601    2480.00
3610    2480.00
3609    2480.00
3608    2480.00
3606    2480.00
3605    2480.00
3648    2480.00
3592    2480.00
3593    2480.00
3602    2480.00
3604    2480.00
3603    2480.00
12176   2000.00
12462   2000.00
12521   2000.00
12170   2000.00
13027   2000.00
11929   2000.00
12179   2000.00
11935   2000.00
12181   2000.00
11800   2000.00
4188    2000.00
12526   2000.00
12959   2000.00
12527   2000.00
11977   2000.00
12469   2000.00
12520   2000.00
12464   2000.00
12265   2000.00
11870   2000.00
10556   2000.00
2903    2000.00
15197   2000.00
12414   2000.00
11988   2000.00
13050   2000.00
12412   2000.00
10464   2000.00
12560   2000.00
12411   2000.00
11032   2000.00
13054   2000.00
Name: Displacement_cc, dtype: float64
```

```
In [21]: df.sort_values(by = ["Displacement_cc"], ascending = True)[ "Displacement_cc" ].head(55)
```

```
Out[21]: 12790    1.00
14319    1.00
14315    1.00
12849    1.00
12848    1.00
12835    1.00
12823    1.00
12815    1.00
12800    1.00
12798    1.00
12796    1.00
12786    1.00
12783    1.00
12781    1.00
12769    1.00
12768    1.00
12750    1.00
12670    1.00
12604    1.00
12554    1.00
12501    1.00
12499    1.00
12484    1.00
12473    1.00
12467    1.00
```

```
14284    1.00
14320    1.00
14321    1.00
14314    1.00
14322    1.00
14328    1.00
14327    1.00
13904    1.00
14325    1.00
14326    1.00
14324    1.00
10559    2.00
14198    2.00
13912    54.00
10194   122.00
7810     139.00
7812     139.00
7811     139.00
7809     139.00
8128     140.00
15578    160.00
15576    160.00
15574    160.00
15575    160.00
15577    160.00
15579    160.00
13653    890.00
14694    898.00
14342    898.00
14695    898.00
Name: Displacement_cc, dtype: float64
```

```
In [22]: outlier_bool_list = df.Displacement_cc.isin([1, 2, 54, 122, 139, 140, 160, 16000, 15898])
```

```
In [23]: outlier_bool_list
```

```
Out[23]: 0      False
1      False
2      False
3      False
4      False
...
15914    False
15915    False
15916    False
15917    False
15918    False
Name: Displacement_cc, Length: 15919, dtype: bool
```

```
In [24]: df.loc[outlier_bool_list, "Displacement_cc"] = np.nan
```

```
In [25]: fill(df, "make_model", "body_type", "Displacement_cc", "mode")
```

```
Number of NaN : 0
-----
1598.00    5077
999.00    2467
1398.00    1388
1399.00    772
1461.00    682
1229.00    678
1956.00    670
1490.00    559
1422.00    467
1197.00    372
898.00     351
1395.00    320
1968.00    301
1149.00    288
1618.00    212
1798.00    210
1498.00    196
1600.00    130
1248.00    110
1997.00    103
1364.00    102
1400.00     90
998.00     72
1500.00     50
```

```

2000.00    46
1000.00    40
1998.00    25
2480.00    20
1984.00    18
1200.00    18
899.00     11
1397.00    11
1499.00    5
929.00     5
1596.00    4
900.00     4
997.00     4
1396.00    3
1199.00    3
1599.00    3
1589.00    2
995.00     2
1300.00    2
1495.00    2
1390.00    1
1696.00    1
1568.00    1
1368.00    1
890.00     1
1239.00    1
1496.00    1
973.00     1
996.00     1
1198.00    1
1333.00    1
1584.00    1
1686.00    1
1856.00    1
1369.00    1
1995.00    1
2967.00    1
1896.00    1
1100.00    1
1195.00    1
1800.00    1
1350.00    1
1580.00    1
1533.00    1
Name: Displacement_cc, dtype: int64

```

In [26]:

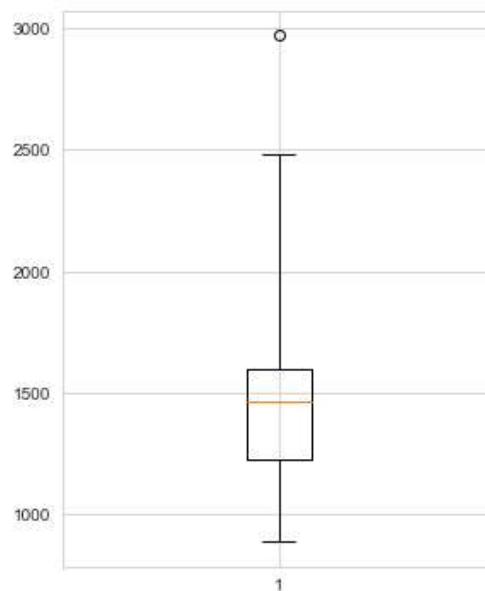
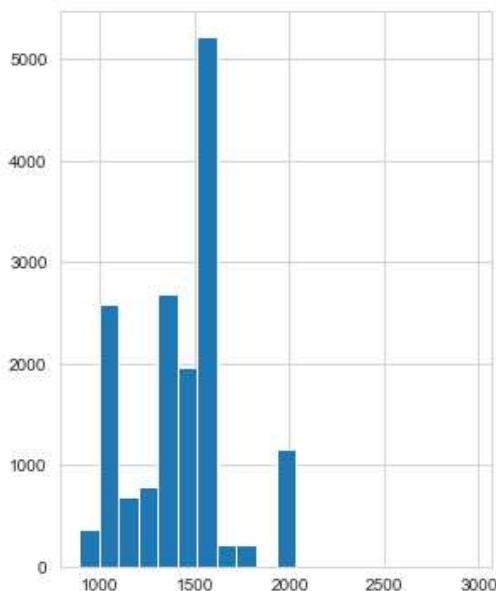
```

plt.figure(figsize=(10,6))
plt.subplot(121)
plt.hist(df.Displacement_cc, bins = 20)

plt.subplot(122)
plt.boxplot(df.Displacement_cc, whis = 2.5)

plt.show()

```



- There is no problem in terms of outliers

Nr_of_Doors

```
In [27]: df.Nr_of_Doors.value_counts(dropna = False)
```

```
Out[27]: 5.00    11787
4.00    3079
3.00    832
2.00    219
7.00     1
1.00     1
Name: Nr_of_Doors, dtype: int64
```

```
In [28]: df.Nr_of_Doors.replace([1, 7], np.nan, inplace=True)
```

```
In [29]: df.Nr_of_Doors.value_counts(dropna = False)
```

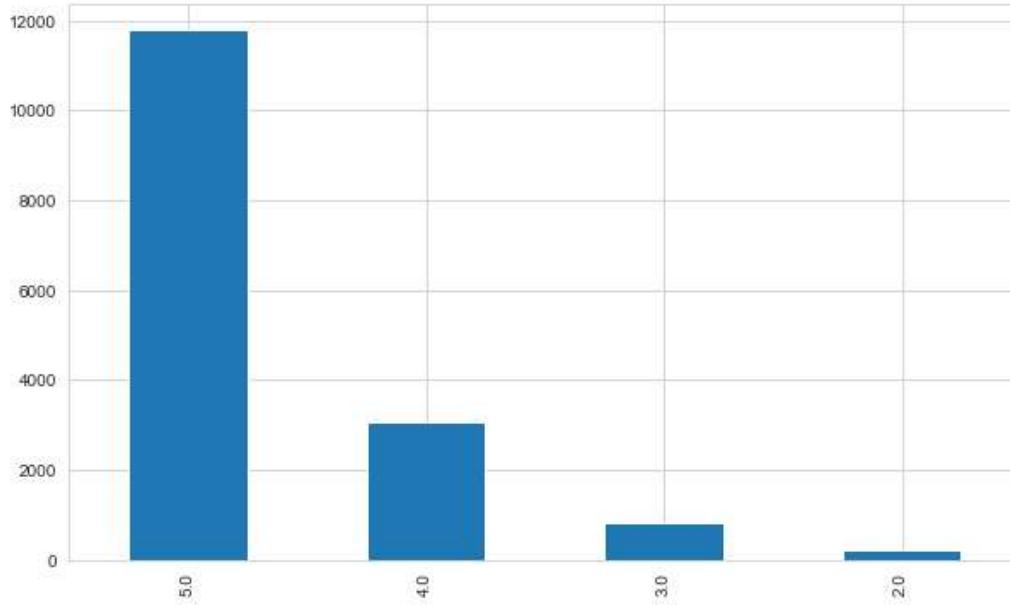
```
Out[29]: 5.00    11787
4.00    3079
3.00    832
2.00    219
NaN      2
Name: Nr_of_Doors, dtype: int64
```

```
In [30]: fill(df, "make_model", "body_type", "Nr_of_Doors", "mode")
```

```
Number of NaN : 0
-----
5.00    11789
4.00    3079
3.00    832
2.00    219
Name: Nr_of_Doors, dtype: int64
```

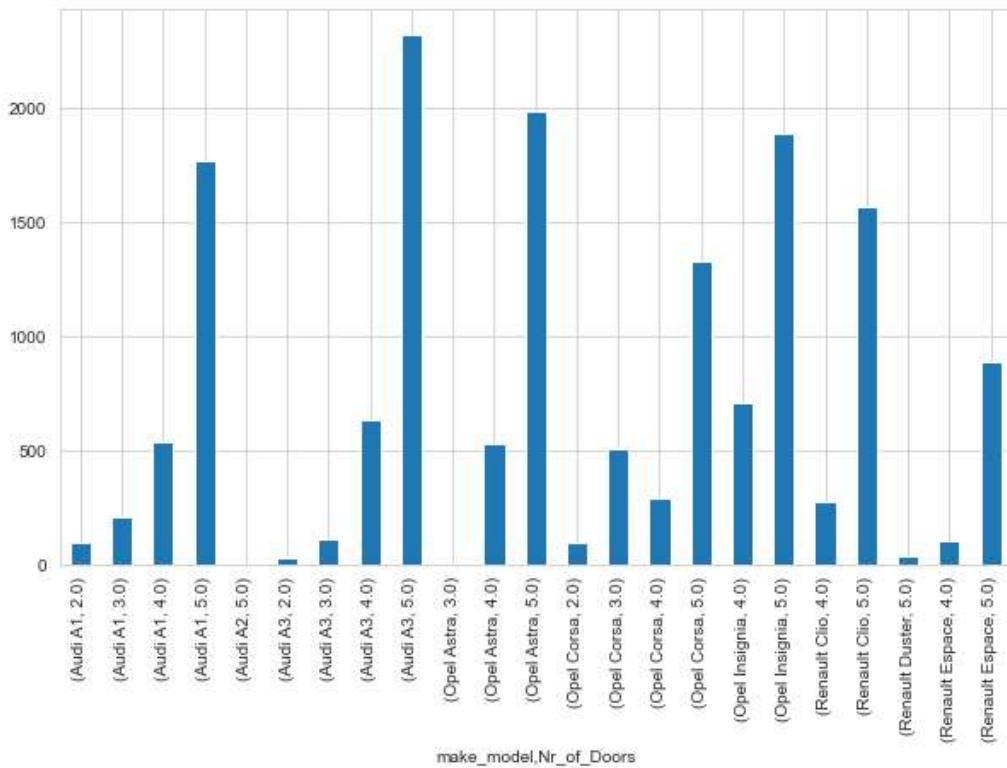
```
In [31]: df.Nr_of_Doors.value_counts(dropna = False).plot.bar()
```

```
Out[31]: <AxesSubplot:
```



```
In [32]: df.groupby(["make_model", "Nr_of_Doors"]).Nr_of_Doors.count().plot.bar()
```

```
Out[32]: <AxesSubplot:xlabel='make_model,Nr_of_Doors'>
```



```
In [33]: df.drop("Nr_of_Doors", axis=1, inplace=True)
```

Nr_of_Seats

```
In [34]: df.Nr_of_Seats.value_counts(dropna = False)
```

```
Out[34]: 5.00    14308
4.00    1127
7.00    362
2.00    119
6.00    2
3.00    1
Name: Nr_of_Seats, dtype: int64
```

```
In [35]: df.Nr_of_Seats.replace([3, 6], np.nan, inplace=True)
```

```
In [36]: df.Nr_of_Seats.value_counts(dropna = False)
```

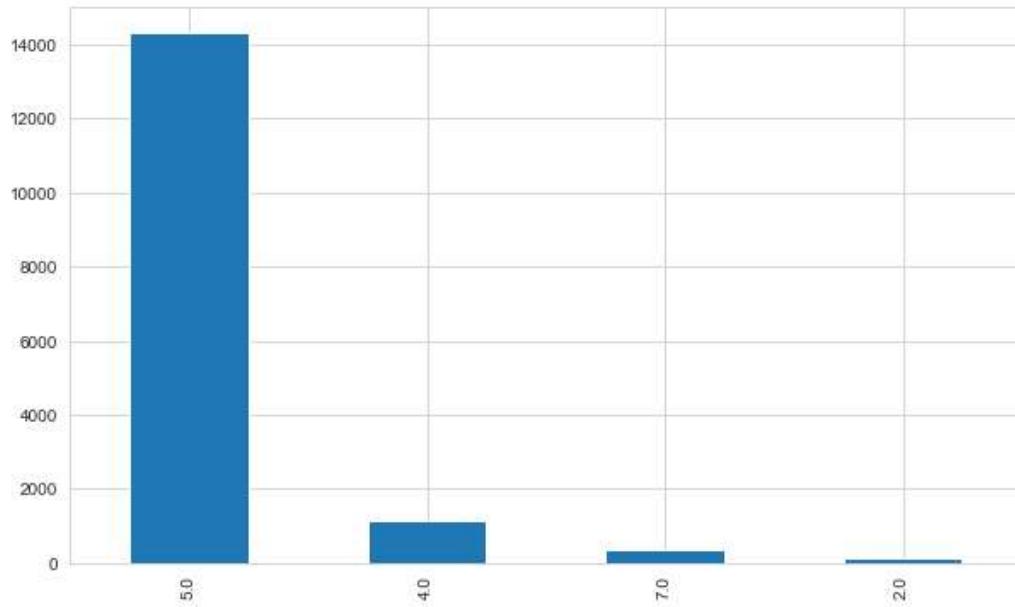
```
Out[36]: 5.00    14308
4.00    1127
7.00    362
2.00    119
NaN      3
Name: Nr_of_Seats, dtype: int64
```

```
In [37]: fill(df, "make_model", "body_type", "Nr_of_Seats", "mode")
```

```
Number of NaN : 0
-----
5.00    14311
4.00    1127
7.00    362
2.00    119
Name: Nr_of_Seats, dtype: int64
```

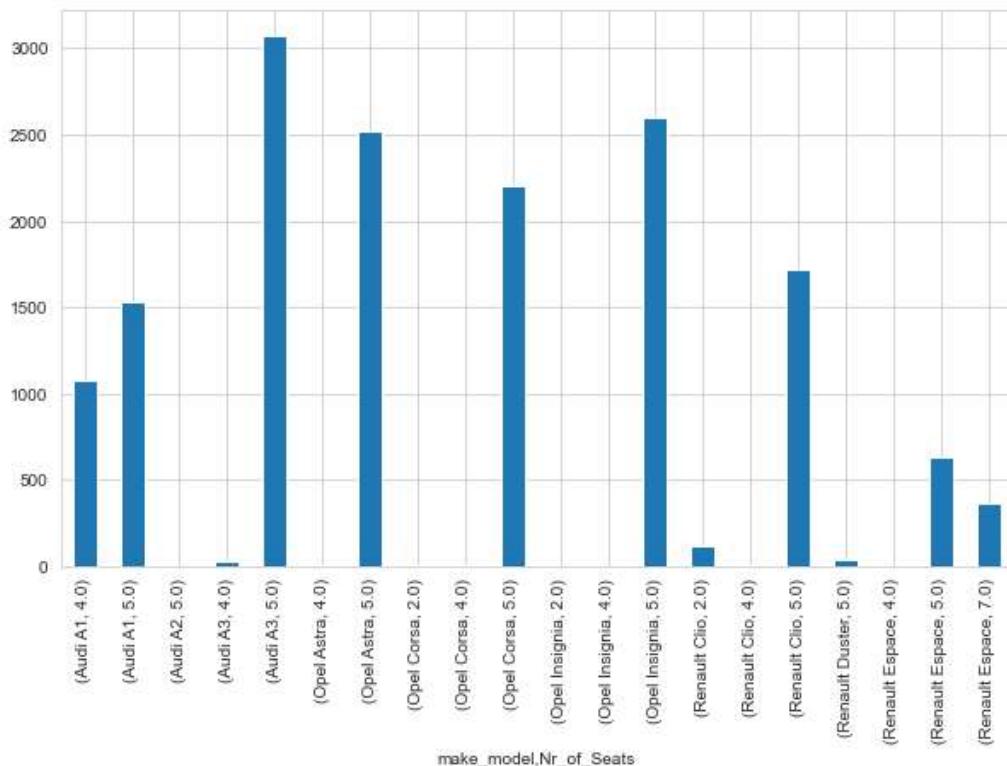
```
In [38]: df.Nr_of_Seats.value_counts(dropna = False).plot.bar()
```

```
Out[38]: <AxesSubplot:>
```



```
In [39]: df.groupby(["make_model", "Nr_of_Seats"]).Nr_of_Seats.count().plot.bar()
```

```
Out[39]: <AxesSubplot:xlabel='make_model,Nr_of_Seats'>
```



```
In [40]: df.drop("Nr_of_Seats", axis=1, inplace=True)
```

Weight_kg

```
In [41]: df.Weight_kg.describe()
```

```
Out[41]: count    15919.00
mean     1337.43
std      200.47
min       1.00
25%    1165.00
50%    1295.00
75%    1472.00
max    2471.00
Name: Weight_kg, dtype: float64
```

```
In [42]: df["Weight_kg"].sort_values().head(10)
```

```
Out[42]: 8355      1.00
12779      1.00
1143       102.00
8857       840.00
14313      900.00
13513      977.00
13555      977.00
14654       980.00
14105      980.00
13999      980.00
Name: Weight_kg, dtype: float64
```

```
In [43]: df["Weight_kg"].replace([1, 102], np.nan, inplace = True)
```

```
In [44]: df["Weight_kg"].isnull().sum()
```

```
Out[44]: 3
```

```
In [45]: fill(df, "make_model", "body_type", "Weight_kg", "mode")
```

```
Number of NaN : 0
```

```
1163.00    1583
1360.00    1419
1487.00    967
1135.00    837
1425.00    744
1180.00    695
1273.00    656
1165.00    603
1503.00    561
1734.00    556
1087.00    291
1335.00    242
1365.00    211
1199.00    205
1350.00    156
1119.00    153
1355.00    136
1280.00    127
1260.00    127
1275.00    112
1278.00    110
1255.00    108
1200.00    107
1522.00    103
1659.00    102
1195.00    96
1120.00    93
1403.00    91
1701.00    87
1250.00    85
1685.00    83
1441.00    82
1308.00    80
1285.00    80
1110.00    75
1613.00    75
1279.00    72
1364.00    70
1345.00    67
1733.00    65
1071.00    64
1209.00    64
1325.00    64
1141.00    64
1230.00    63
1845.00    56
1090.00    54
1052.00    53
1664.00    52
1154.00    52
1513.00    51
1065.00    50
1237.00    49
1205.00    46
1088.00    46
1440.00    46
1265.00    45
1395.00    44
```

1666.00	43
1585.00	43
1162.00	42
1134.00	42
1288.00	40
1393.00	40
1248.00	40
1472.00	38
1092.00	38
1552.00	36
1263.00	36
1820.00	35
1456.00	35
1415.00	35
1615.00	33
1146.00	33
1623.00	32
1840.00	32
1328.00	31
1228.00	31
1680.00	31
1633.00	29
1215.00	29
1322.00	29
1385.00	28
1571.00	27
1063.00	27
1276.00	27
1743.00	27
1315.00	27
1155.00	27
1059.00	26
1220.00	25
1580.00	25
1660.00	24
1105.00	22
1790.00	22
1173.00	21
1695.00	21
1388.00	20
1170.00	20
1635.00	20
1300.00	20
1370.00	19
1198.00	19
1582.00	19
1890.00	19
1225.00	19
1537.00	18
1310.00	18
1655.00	17
1518.00	16
1540.00	16
1843.00	16
1400.00	16
2353.00	15
1055.00	15
1380.00	15
1760.00	15
1235.00	15
1510.00	14
1305.00	14
1640.00	14
1708.00	14
1596.00	14
1630.00	13
1815.00	13
1079.00	13
1758.00	13
1270.00	13
1100.00	12
1240.00	12
2300.00	12
1340.00	12
1378.00	12
1214.00	12
1684.00	11
980.00	11
1234.00	11
1140.00	11
1717.00	11
1647.00	11
1035.00	11
1175.00	11
1082.00	10

1567.00	10
1295.00	10
1156.00	10
1485.00	10
1203.00	10
1658.00	9
1133.00	9
1621.00	9
1833.00	9
1233.00	9
1330.00	9
1144.00	9
1609.00	9
1500.00	9
1244.00	9
1410.00	9
1290.00	9
1624.00	9
1320.00	9
1341.00	8
1372.00	8
1550.00	8
1880.00	8
1437.00	8
1245.00	8
1115.00	8
1216.00	8
1179.00	8
1772.00	8
1178.00	8
1674.00	8
1259.00	8
1239.00	8
1625.00	8
1740.00	8
1256.00	7
1204.00	7
1164.00	7
1584.00	7
1985.00	7
1901.00	7
1543.00	7
1525.00	7
1665.00	7
1125.00	7
1560.00	7
1975.00	7
1227.00	6
1293.00	6
1157.00	6
1184.00	6
1765.00	6
2000.00	6
1124.00	6
1126.00	6
1091.00	6
1651.00	6
1940.00	6
1326.00	5
1610.00	5
1716.00	5
1697.00	5
1145.00	5
1390.00	5
1634.00	5
1795.00	5
1626.00	5
2471.00	5
1735.00	5
1356.00	5
1462.00	4
1194.00	4
1778.00	4
1054.00	4
1130.00	4
1447.00	4
1247.00	4
1084.00	4
1097.00	4
1459.00	4
1123.00	4
1564.00	4
1622.00	4
1352.00	4
1670.00	4

1538.00	4
1800.00	4
1121.00	4
1010.00	4
1224.00	4
1865.00	4
1153.00	4
1160.00	4
2410.00	4
1166.00	4
1422.00	4
1736.00	4
1455.00	4
1236.00	4
1452.00	4
1099.00	4
1618.00	4
1900.00	4
1196.00	4
1600.00	4
1530.00	4
1041.00	3
1118.00	3
1066.00	3
1449.00	3
1185.00	3
1958.00	3
1136.00	3
1875.00	3
1284.00	3
1730.00	3
1405.00	3
1566.00	3
1779.00	3
1850.00	3
1142.00	3
1190.00	3
1289.00	3
1590.00	3
1750.00	3
1475.00	3
1086.00	3
1673.00	3
1608.00	3
1809.00	3
1490.00	3
1114.00	3
1238.00	3
1139.00	3
1786.00	3
1495.00	3
1549.00	3
1838.00	2
2320.00	2
1788.00	2
1176.00	2
1563.00	2
1060.00	2
1408.00	2
1094.00	2
1470.00	2
1147.00	2
1354.00	2
1675.00	2
2450.00	2
1268.00	2
1929.00	2
2280.00	2
1211.00	2
977.00	2
1318.00	2
1413.00	2
1515.00	2
1595.00	2
1210.00	2
1375.00	2
1138.00	2
1298.00	2
1536.00	2
1387.00	2
1128.00	2
1741.00	2
1483.00	2
1152.00	2
1807.00	2

2400.00	2
1534.00	2
1127.00	2
1208.00	2
1465.00	2
1182.00	2
1040.00	2
1702.00	1
1319.00	1
1207.00	1
2275.00	1
1974.00	1
1312.00	1
1444.00	1
1686.00	1
1223.00	1
1363.00	1
2037.00	1
1201.00	1
1523.00	1
1780.00	1
1383.00	1
1396.00	1
1668.00	1
1171.00	1
1435.00	1
1332.00	1
1057.00	1
1960.00	1
1601.00	1
1428.00	1
1905.00	1
1366.00	1
1870.00	1
1206.00	1
1650.00	1
1720.00	1
1705.00	1
2295.00	1
1331.00	1
2115.00	1
1137.00	1
840.00	1
1252.00	1
1150.00	1
1343.00	1
1181.00	1
1188.00	1
1430.00	1
1791.00	1
2240.00	1
1598.00	1
1713.00	1
1167.00	1
1761.00	1
1885.00	1
1804.00	1
2270.00	1
1169.00	1
1283.00	1
2355.00	1
1394.00	1
1030.00	1
1397.00	1
1333.00	1
1648.00	1
1507.00	1
1294.00	1
1258.00	1
1291.00	1
1277.00	1
1505.00	1
1213.00	1
1217.00	1
1058.00	1
1939.00	1
1374.00	1
1267.00	1
1302.00	1
1471.00	1
1565.00	1
1548.00	1
1257.00	1
1649.00	1
1382.00	1

```
2044.00      1
1645.00      1
1555.00      1
1492.00      1
1724.00      1
1785.00      1
1792.00      1
2110.00      1
1575.00      1
1254.00      1
1819.00      1
1683.00      1
1589.00      1
1143.00      1
1891.00      1
1420.00      1
1189.00      1
1281.00      1
2080.00      1
1591.00      1
1161.00      1
1379.00      1
1711.00      1
1764.00      1
1476.00      1
1017.00      1
1009.00      1
1132.00      1
1847.00      1
1797.00      1
1950.00      1
900.00       1
1272.00      1
1159.00      1
Name: Weight_kg, dtype: int64
```

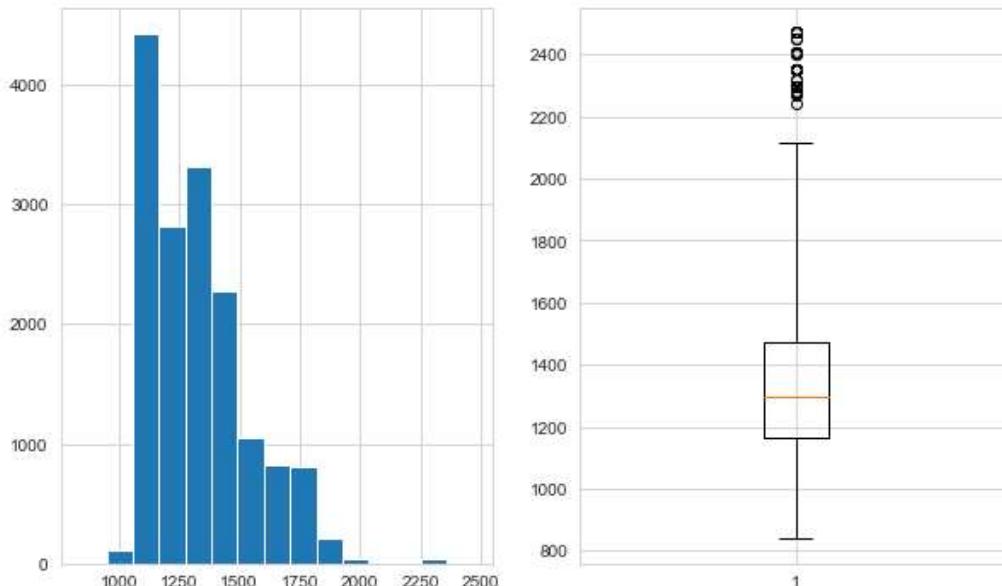
In [46]:

```
plt.figure(figsize=(10,6))

plt.subplot(121)
plt.hist(df.Weight_kg, bins=15)

plt.subplot(122)
plt.boxplot(df.Weight_kg, whis=2.5)

plt.show()
```



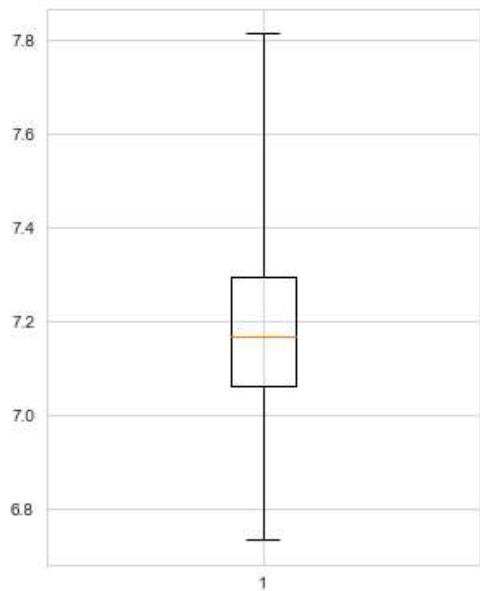
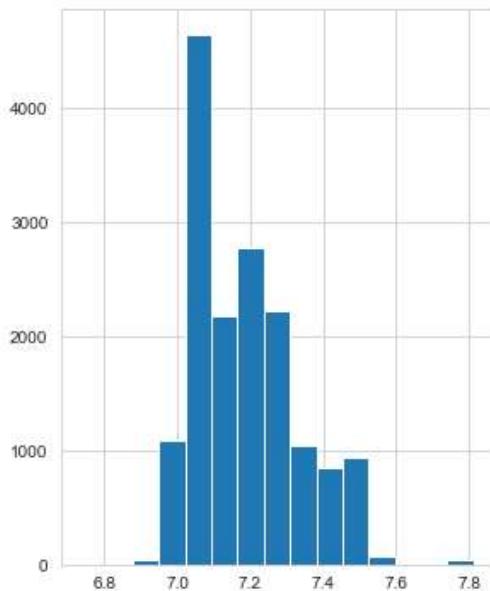
In [47]:

```
plt.figure(figsize=(10,6))

plt.subplot(121)
plt.hist(np.log(df.Weight_kg), bins=15)

plt.subplot(122)
plt.boxplot(np.log(df.Weight_kg), whis=2.5)

plt.show()
```



hp_kw

```
In [48]: df.hp_kw.describe()
```

```
Out[48]: count    15919.00
mean      88.37
std       26.84
min       1.00
25%      66.00
50%      85.00
75%     101.00
max     294.00
Name: hp_kw, dtype: float64
```

```
In [49]: df.hp_kw.sort_values().head(50)
```

```
Out[49]: 6034    1.00
6946    1.00
7014    1.00
9285    1.00
9287    1.00
6005    1.00
9288    1.00
7018    1.00
9289    1.00
9290    1.00
9292    1.00
9299    1.00
10610   1.00
10580   1.00
10579   1.00
10468   1.00
15155   1.00
15156   1.00
7019    1.00
7016    1.00
13885   4.00
3913    9.00
8857    40.00
13759   40.00
8408    44.00
10282   51.00
10283   51.00
10284   51.00
10285   51.00
10286   51.00
10287   51.00
9145    51.00
10288   51.00
10346   51.00
10281   51.00
10330   51.00
9026    51.00
9025    51.00
10342   51.00
10289   51.00
```

```
9159    51.00
9384    51.00
9158    51.00
10290    51.00
10291    51.00
10345    51.00
10280    51.00
10279    51.00
10278    51.00
10264    51.00
Name: hp_kw, dtype: float64
```

```
In [50]: df.hp_kw.unique()
```

```
Out[50]: array([ 66., 141., 85., 70., 92., 112., 60., 71., 67., 110., 93.,
 147., 86., 140., 87., 81., 82., 135., 132., 100., 96., 162.,
 150., 294., 228., 270., 137., 9., 133., 77., 101., 78., 103.,
 1., 74., 118., 84., 88., 80., 76., 149., 51., 44., 55.,
 52., 63., 40., 65., 75., 125., 120., 184., 239., 121., 143.,
 191., 89., 195., 127., 122., 154., 155., 104., 123., 146., 90.,
 56., 53., 54., 164., 4., 163., 57., 119., 165., 117., 115.,
 98., 168., 167.])
```

```
In [51]: df.hp_kw.loc[df.hp_kw < 40] = np.nan
```

```
In [52]: df.hp_kw.isnull().sum()
```

```
Out[52]: 22
```

```
In [53]: fill(df, "make_model", "body_type", "hp_kw", "mode")
```

```
Number of NaN : 0
```

```
-----  
85.00    2544  
66.00    2124  
81.00    1403  
100.00   1317  
110.00   1117  
70.00    890  
125.00   715  
51.00    703  
55.00    589  
118.00   552  
92.00    466  
121.00   392  
147.00   380  
77.00    353  
56.00    295  
54.00    276  
103.00   253  
87.00    232  
165.00   194  
88.00    177  
60.00    160  
162.00   98  
74.00    81  
96.00    72  
71.00    59  
101.00   47  
67.00    40  
154.00   39  
122.00   35  
119.00   30  
164.00   27  
135.00   24  
82.00    22  
52.00    22  
78.00    20  
146.00   18  
294.00   18  
141.00   16  
57.00    10  
120.00   8  
104.00   8  
191.00   7  
112.00   7  
155.00   6  
117.00   6  
184.00   5
```

```
90.00      4
65.00      4
76.00      4
98.00      3
80.00      3
93.00      3
149.00     3
168.00     3
40.00      2
86.00      2
53.00      2
228.00     2
167.00     2
143.00     2
150.00     2
63.00      2
140.00     2
89.00      2
127.00     2
270.00     2
239.00     1
44.00      1
195.00     1
132.00     1
133.00     1
115.00     1
163.00     1
84.00      1
137.00     1
123.00     1
75.00      1
Name: hp_kw, dtype: int64
```

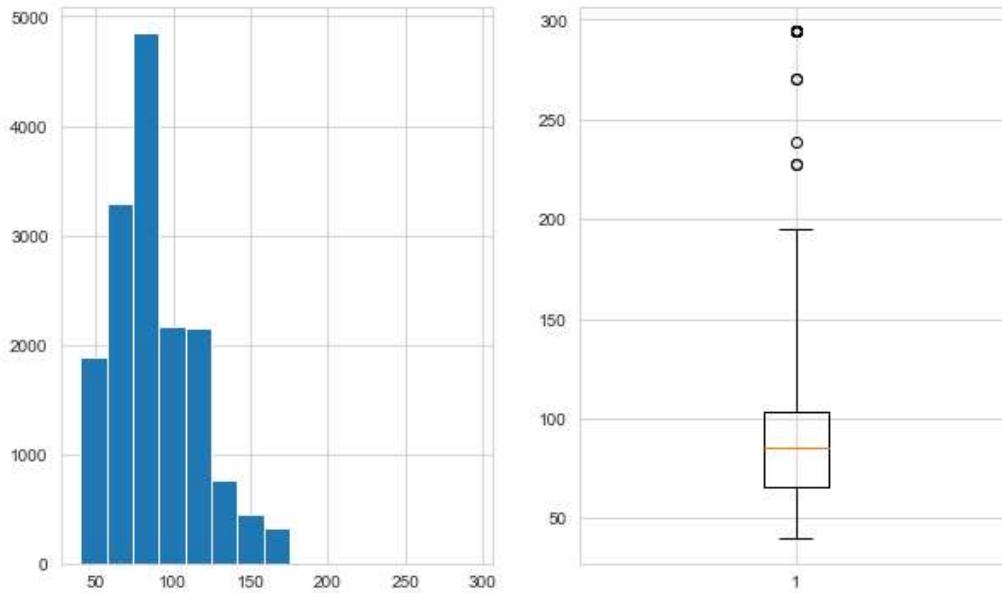
In [54]:

```
plt.figure(figsize=(10,6))

plt.subplot(121)
plt.hist(df.hp_kw, bins=15)

plt.subplot(122)
plt.boxplot(df.hp_kw, whis=2.5)

plt.show()
```



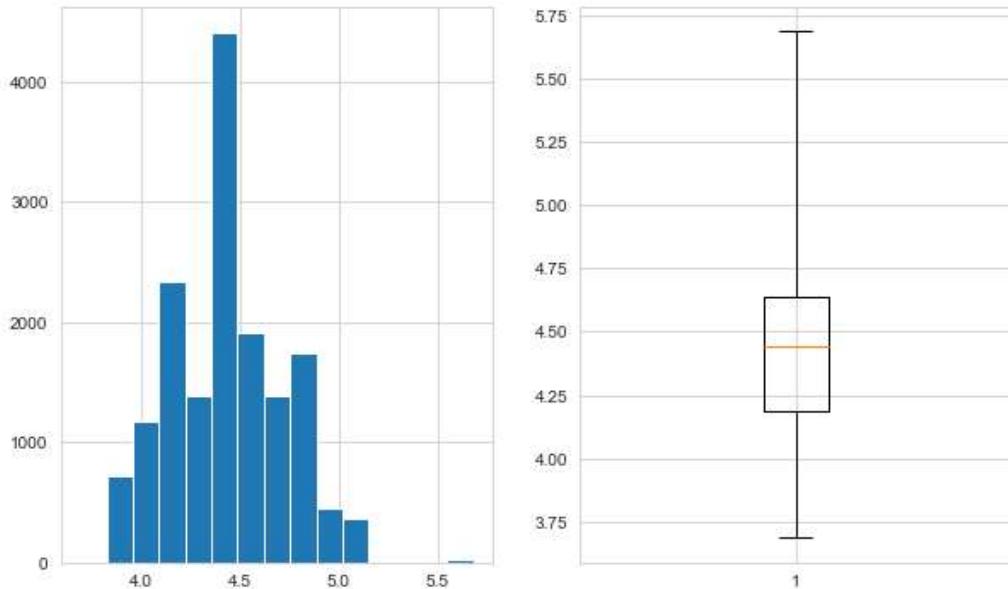
In [55]:

```
plt.figure(figsize=(10,6))

plt.subplot(121)
plt.hist(np.log(df.hp_kw), bins=15)

plt.subplot(122)
plt.boxplot(np.log(df.hp_kw), whis=2.5)

plt.show()
```



CO2_Emission

In [56]: `df.CO2_Emission.describe()`

Out[56]:

	count	mean	std	min	25%	50%	75%	max
Name:	CO2_Emission	dtype: float64						

In [57]: `df.CO2_Emission.value_counts().sort_index()`

Out[57]:

CO2_Emission	Count
0.00	2
1.00	84
1.06	1
5.00	3
8.00	25
9.00	198
10.00	477
11.00	171
12.09	3
12.32	1
13.00	100
13.98	1
14.00	59
14.46	1
15.00	28
16.00	2
17.00	25
36.00	3
45.00	1
51.00	1
80.00	1
84.00	2
85.00	275
87.00	6
88.00	15
89.00	19
90.00	54
91.00	31
93.00	66
94.00	37
95.00	161
96.00	22
97.00	539
98.00	366
99.00	546
100.00	36
101.00	105
103.00	445
104.00	679
105.00	202

106.00	674
107.00	362
108.00	362
109.00	234
110.00	289
111.00	237
112.50	1
113.00	235
114.00	556
115.00	86
116.00	157
116.50	3
117.00	460
118.00	314
118.50	147
119.00	361
120.00	836
121.00	82
123.00	410
124.00	516
125.00	133
126.00	284
127.00	257
128.00	329
129.00	333
130.00	189
131.00	48
133.00	330
134.00	130
135.00	202
136.00	145
137.00	135
138.00	75
139.00	523
140.00	221
141.00	156
143.00	171
144.00	40
145.00	126
146.00	36
147.00	109
148.00	48
149.00	117
150.00	174
151.00	34
153.00	113
154.00	40
155.00	8
156.00	14
157.00	18
158.00	17
159.00	7
160.00	1
161.00	10
164.00	17
165.00	1
166.00	8
167.00	2
168.00	58
169.00	15
170.00	10
171.00	1
174.00	6
175.00	8
177.00	1
180.00	1
181.00	1
183.00	1
184.00	1
186.00	31
187.00	26
188.00	7
189.00	19
190.00	1
191.00	2
193.00	1
194.00	3
197.00	4
199.00	2
239.00	1
253.00	1
331.00	1
990.00	1

Name: CO2_Emission, dtype: int64

In [58]: df.groupby(["make_model", "body_type","CO2_Emission"]).price.describe()

Out[58]:

make_model	body_type	CO2_Emission	count	mean	std	min	25%	50%	75%	max
Audi A1	Compact	1.00	1.00	20881.00	NaN	20881.00	20881.00	20881.00	20881.00	20881.00
		9.00	1.00	12479.00	NaN	12479.00	12479.00	12479.00	12479.00	12479.00
		10.00	147.00	16946.87	2850.06	9950.00	15765.00	16450.00	18333.00	29150.00
		11.00	25.00	19960.36	2676.26	14930.00	17970.00	19990.00	21460.00	28980.00
		14.00	2.00	28750.00	268.70	28560.00	28655.00	28750.00	28845.00	28940.00
		90.00	1.00	12880.00	NaN	12880.00	12880.00	12880.00	12880.00	12880.00
		91.00	5.00	13038.00	1108.93	11800.00	11850.00	13800.00	13800.00	13940.00
		94.00	5.00	13960.00	1232.07	12900.00	12900.00	13900.00	14200.00	15900.00
		97.00	113.00	15449.59	2445.75	10900.00	13770.00	15400.00	16700.00	23500.00
		98.00	33.00	16574.36	2637.09	13999.00	15290.00	15900.00	16800.00	25256.00
		99.00	19.00	16043.95	2257.40	10900.00	14585.00	16900.00	17925.00	18880.00
		100.00	4.00	16127.50	1583.40	14220.00	15247.50	16195.00	17075.00	17900.00
		103.00	30.00	21233.03	1794.55	18350.00	19225.00	22189.50	22448.50	23550.00
		104.00	218.00	17712.23	3766.51	11100.00	14990.00	16685.00	20929.25	31990.00
		105.00	14.00	22234.86	812.26	20840.00	21746.75	22490.00	22861.75	22990.00
		106.00	43.00	19831.79	3335.79	13685.00	16410.00	21770.00	22490.00	22990.00
		107.00	13.00	16527.69	1620.41	14470.00	15830.00	16430.00	16430.00	19890.00
		108.00	42.00	23587.10	3375.69	15970.00	20990.00	23565.00	25942.50	29190.00
		109.00	34.00	17029.32	2514.31	12750.00	15765.00	16455.00	16980.00	23829.00
		110.00	51.00	26340.37	2434.74	19990.00	24825.00	26980.00	28290.00	29197.00
		111.00	138.00	23765.28	3477.92	18288.00	20888.75	22785.00	27380.00	28990.00
		113.00	5.00	20388.00	2796.19	16480.00	18620.00	21490.00	21900.00	23450.00
		114.00	1.00	15490.00	NaN	15490.00	15490.00	15490.00	15490.00	15490.00
		115.00	7.00	24067.86	6950.65	13480.00	20450.00	28380.00	28420.00	28875.00
		116.00	20.00	23580.95	2813.10	17900.00	22175.00	22865.00	23972.75	28999.00
		117.00	8.00	19094.88	2942.95	14700.00	16732.50	19779.50	21080.00	22790.00
		118.00	2.00	13615.00	91.92	13550.00	13582.50	13615.00	13647.50	13680.00
		119.00	1.00	12550.00	NaN	12550.00	12550.00	12550.00	12550.00	12550.00
		120.00	27.00	15850.00	0.00	15850.00	15850.00	15850.00	15850.00	15850.00
		121.00	2.00	18710.00	3224.41	16430.00	17570.00	18710.00	19850.00	20990.00
		123.00	17.00	19308.65	3816.07	13475.00	16879.00	18880.00	21950.00	28880.00
		126.00	1.00	19999.00	NaN	19999.00	19999.00	19999.00	19999.00	19999.00
		127.00	2.00	19888.00	0.00	19888.00	19888.00	19888.00	19888.00	19888.00
		134.00	2.00	22495.00	841.46	21900.00	22197.50	22495.00	22792.50	23090.00
		136.00	2.00	29088.00	128.69	28997.00	29042.50	29088.00	29133.50	29179.00
		137.00	2.00	28660.00	282.84	28460.00	28560.00	28660.00	28760.00	28860.00
		331.00	1.00	12990.00	NaN	12990.00	12990.00	12990.00	12990.00	12990.00
	Coupe	97.00	2.00	14925.00	1378.86	13950.00	14437.50	14925.00	15412.50	15900.00
	Sedans	9.00	42.00	15764.55	1578.28	13680.00	15090.00	15090.00	15532.50	18900.00
	10.00	198.00	17497.91	2518.19	10000.00	15970.50	16890.00	19537.50	23000.00	
	11.00	42.00	19247.60	2058.25	14930.00	17710.00	18900.00	20938.75	22805.00	
	89.00	4.00	16572.50	288.14	16200.00	16417.50	16645.00	16800.00	16800.00	

			count	mean	std	min	25%	50%	75%	max
make_model	body_type	CO2_Emission								
		90.00	3.00	14396.33	532.38	13990.00	14095.00	14200.00	14599.50	14999.00
		91.00	14.00	14228.50	1438.93	12699.00	13087.50	13845.00	15122.50	16900.00
		94.00	12.00	15710.00	2522.33	11490.00	14337.50	15650.00	17550.00	19900.00
		95.00	2.00	13070.00	2305.17	11440.00	12255.00	13070.00	13885.00	14700.00
		97.00	315.00	14905.86	1996.27	8999.00	13640.00	14880.00	15980.00	21800.00
		98.00	281.00	19054.84	4194.05	11990.00	15700.00	18200.00	21980.00	28990.00
		99.00	101.00	16177.22	2115.76	10800.00	14640.00	16650.00	17500.00	21500.00
		100.00	3.00	14490.00	0.00	14490.00	14490.00	14490.00	14490.00	14490.00
		101.00	5.00	19228.00	1683.57	17650.00	17900.00	18850.00	19990.00	21750.00
		103.00	10.00	17725.00	3092.08	13890.00	14890.00	17945.00	19442.50	23440.00
		104.00	88.00	18441.47	3010.82	11890.00	16210.00	18950.00	20884.25	25900.00
		105.00	55.00	19634.27	2174.29	12999.00	18500.00	19500.00	21895.00	22930.00
		106.00	12.00	19900.00	3316.86	13490.00	17712.50	21720.00	22480.00	23500.00
		107.00	12.00	18797.42	3165.17	11000.00	17329.25	20150.00	20650.00	21550.00
		108.00	156.00	25021.45	2928.90	17250.00	22675.00	25200.00	26992.50	35900.00
		109.00	19.00	17422.74	3006.03	13880.00	15430.00	16430.00	19452.50	22570.00
		110.00	61.00	25970.90	2717.82	15000.00	24690.00	26500.00	27650.00	28990.00
		111.00	42.00	23100.07	2480.13	19490.00	21721.75	22489.50	22900.00	29137.00
		113.00	2.00	18905.00	1534.42	17820.00	18362.50	18905.00	19447.50	19990.00
		114.00	11.00	16333.55	1946.34	13500.00	15567.00	16360.00	16892.50	20420.00
		115.00	9.00	19398.33	5906.52	13480.00	15750.00	16980.00	20500.00	29000.00
		116.00	11.00	24591.82	3473.75	20980.00	21390.00	22989.00	28211.00	28819.00
		117.00	3.00	18329.67	3752.07	14500.00	16495.00	18490.00	20244.50	21999.00
		118.00	4.00	14049.75	998.42	13000.00	13599.25	13899.50	14350.00	15400.00
		121.00	4.00	17960.00	2364.92	15480.00	16530.00	17685.00	19115.00	20990.00
		123.00	4.00	20467.75	2185.64	17990.00	19115.00	20445.00	21797.75	22991.00
		128.00	5.00	20304.60	1130.64	18990.00	19364.00	20690.00	20690.00	21789.00
		129.00	12.00	21063.17	2359.11	14500.00	20497.50	21157.50	22742.50	23000.00
		134.00	1.00	23490.00	NaN	23490.00	23490.00	23490.00	23490.00	23490.00
		136.00	6.00	29178.00	5225.04	21420.00	28880.00	28935.00	28996.00	37900.00
		137.00	1.00	17490.00	NaN	17490.00	17490.00	17490.00	17490.00	17490.00
		138.00	1.00	28990.00	NaN	28990.00	28990.00	28990.00	28990.00	28990.00
Station wagon	10.00	6.00	15430.00	1229.37	12950.00	15775.00	15850.00	15880.00	16290.00	
	11.00	2.00	19445.00	2835.50	17440.00	18442.50	19445.00	20447.50	21450.00	
	91.00	1.00	13999.00	NaN	13999.00	13999.00	13999.00	13999.00	13999.00	
	97.00	4.00	15642.50	1226.01	14440.00	14672.50	15625.00	16595.00	16880.00	
	98.00	1.00	16422.00	NaN	16422.00	16422.00	16422.00	16422.00	16422.00	
	103.00	1.00	20940.00	NaN	20940.00	20940.00	20940.00	20940.00	20940.00	
	104.00	1.00	16480.00	NaN	16480.00	16480.00	16480.00	16480.00	16480.00	
	106.00	1.00	28999.00	NaN	28999.00	28999.00	28999.00	28999.00	28999.00	
	109.00	2.00	20145.00	714.18	19640.00	19892.50	20145.00	20397.50	20650.00	
	111.00	1.00	28890.00	NaN	28890.00	28890.00	28890.00	28890.00	28890.00	
	118.00	1.00	13979.00	NaN	13979.00	13979.00	13979.00	13979.00	13979.00	

			count	mean	std	min	25%	50%	75%	max
make_model	body_type	CO2_Emission								
	Van	99.00	1.00	29000.00	NaN	29000.00	29000.00	29000.00	29000.00	29000.00
Audi A2	Off-Road	114.00	1.00	28200.00	NaN	28200.00	28200.00	28200.00	28200.00	28200.00
Audi A3	Compact	1.00	1.00	14900.00	NaN	14900.00	14900.00	14900.00	14900.00	14900.00
		10.00	5.00	19260.00	725.78	18000.00	19400.00	19400.00	19750.00	19750.00
		11.00	3.00	15950.00	0.00	15950.00	15950.00	15950.00	15950.00	15950.00
		89.00	3.00	14613.33	1559.50	12900.00	13945.00	14990.00	15470.00	15950.00
		99.00	21.00	17341.57	2409.49	13450.00	15900.00	17444.00	18450.00	23600.00
		101.00	5.00	15746.20	2067.33	13444.00	14530.00	14888.00	17900.00	17969.00
		104.00	6.00	18095.00	1546.29	15445.00	17452.50	18892.50	18948.75	19400.00
		105.00	7.00	15950.00	1256.98	15000.00	15000.00	15500.00	16350.00	18450.00
		106.00	68.00	21632.72	7369.28	13100.00	16898.75	19994.50	23237.50	41495.00
		107.00	8.00	21397.50	1388.53	18700.00	20740.00	22300.00	22300.00	22300.00
		108.00	10.00	20285.00	1106.56	19000.00	19250.00	20300.00	20812.50	22300.00
		111.00	1.00	17990.00	NaN	17990.00	17990.00	17990.00	17990.00	17990.00
		113.00	1.00	29950.00	NaN	29950.00	29950.00	29950.00	29950.00	29950.00
		114.00	2.00	22987.50	441.94	22675.00	22831.25	22987.50	23143.75	23300.00
		115.00	1.00	31950.00	NaN	31950.00	31950.00	31950.00	31950.00	31950.00
		116.00	1.00	16950.00	NaN	16950.00	16950.00	16950.00	16950.00	16950.00
		117.00	2.00	19700.00	7353.91	14500.00	17100.00	19700.00	22300.00	24900.00
		118.00	1.00	16900.00	NaN	16900.00	16900.00	16900.00	16900.00	16900.00
		119.00	34.00	13713.24	1243.36	13500.00	13500.00	13500.00	13500.00	20750.00
		121.00	1.00	18420.00	NaN	18420.00	18420.00	18420.00	18420.00	18420.00
		189.00	1.00	67600.00	NaN	67600.00	67600.00	67600.00	67600.00	67600.00
Convertible	Convertible	99.00	1.00	20900.00	NaN	20900.00	20900.00	20900.00	20900.00	20900.00
		116.00	1.00	10893.00	NaN	10893.00	10893.00	10893.00	10893.00	10893.00
		117.00	1.00	29500.00	NaN	29500.00	29500.00	29500.00	29500.00	29500.00
		124.00	3.00	27950.00	6960.78	20000.00	25450.00	30900.00	31925.00	32950.00
		134.00	1.00	22000.00	NaN	22000.00	22000.00	22000.00	22000.00	22000.00
		153.00	1.00	56100.00	NaN	56100.00	56100.00	56100.00	56100.00	56100.00
Coupe	Coupe	99.00	3.00	17326.67	583.12	16990.00	16990.00	16990.00	17495.00	18000.00
		106.00	1.00	19000.00	NaN	19000.00	19000.00	19000.00	19000.00	19000.00
	Sedans	1.00	7.00	18755.71	381.31	18000.00	18650.00	18990.00	19000.00	19000.00
		1.06	1.00	19500.00	NaN	19500.00	19500.00	19500.00	19500.00	19500.00
		9.00	1.00	15500.00	NaN	15500.00	15500.00	15500.00	15500.00	15500.00
		10.00	36.00	19751.92	2430.39	14490.00	17900.00	20525.00	21500.00	24700.00
		11.00	22.00	22455.32	4039.73	12500.00	20592.50	22743.50	24550.00	33000.00
		14.00	1.00	23900.00	NaN	23900.00	23900.00	23900.00	23900.00	23900.00
		15.00	1.00	25000.00	NaN	25000.00	25000.00	25000.00	25000.00	25000.00
		36.00	3.00	37449.67	1361.64	35899.00	36949.50	38000.00	38225.00	38450.00
		85.00	2.00	13099.50	212.84	12949.00	13024.25	13099.50	13174.75	13250.00
		88.00	1.00	17430.00	NaN	17430.00	17430.00	17430.00	17430.00	17430.00
		89.00	4.00	14812.00	1892.54	11999.00	14549.75	15625.00	15887.25	15999.00
		91.00	9.00	21433.33	2994.58	14900.00	20500.00	22000.00	22100.00	26000.00

			count	mean	std	min	25%	50%	75%	max
make_model	body_type	CO2_Emission								
		94.00	9.00	19477.67	2533.71	15500.00	17800.00	18900.00	21000.00	23500.00
		95.00	2.00	30819.00	5542.30	26900.00	28859.50	30819.00	32778.50	34738.00
		96.00	1.00	18879.00	NaN	18879.00	18879.00	18879.00	18879.00	18879.00
		97.00	6.00	23231.67	8023.72	15000.00	16375.00	22345.00	29222.50	33800.00
		98.00	13.00	17897.54	1557.83	15700.00	16499.00	17960.00	18840.00	20490.00
		99.00	322.00	17542.66	2692.04	11990.00	15837.50	16900.00	18500.00	28900.00
		100.00	1.00	15690.00	NaN	15690.00	15690.00	15690.00	15690.00	15690.00
		101.00	39.00	16901.03	3743.82	11990.00	14925.00	15950.00	17414.50	28990.00
		103.00	348.00	23387.59	2650.35	17300.00	21500.00	22900.00	25500.00	32200.00
		104.00	61.00	20057.98	3003.24	12900.00	18666.00	20400.00	21461.00	27300.00
		105.00	74.00	19238.84	3144.61	13950.00	15942.50	19620.00	21990.00	24200.00
		106.00	534.00	19934.64	3473.76	10950.00	17453.75	20000.00	22272.50	27470.00
		107.00	175.00	19694.33	2408.30	10550.00	18495.00	19500.00	21070.00	28490.00
		108.00	136.00	20518.77	2863.59	13990.00	19480.00	20890.00	21925.00	25430.00
		109.00	69.00	20178.54	2748.12	13900.00	18899.00	20990.00	21490.00	26750.00
		110.00	24.00	19321.92	2644.58	14500.00	17890.00	18640.00	20417.50	25460.00
		111.00	42.00	20131.02	2181.58	15890.00	18920.00	19999.00	21555.00	25490.00
		113.00	15.00	23310.87	3853.97	17890.00	21942.50	23330.00	24980.00	33250.00
		114.00	151.00	23495.12	3476.05	13900.00	21795.00	23880.00	24900.00	34500.00
		115.00	21.00	23253.95	4038.68	14500.00	21579.00	24890.00	26600.00	29990.00
		116.00	24.00	17221.17	2389.58	12999.00	15705.00	17170.00	18073.00	23750.00
		117.00	169.00	24444.11	2640.05	15480.00	23200.00	24870.00	26488.00	28500.00
		118.00	112.00	23421.78	3049.02	14900.00	22388.00	23000.00	24567.50	35000.00
		119.00	54.00	19451.98	3693.67	12850.00	17000.00	18475.00	21792.50	27500.00
		120.00	10.00	24557.00	3568.37	17980.00	22315.00	25710.00	26665.00	30000.00
		121.00	13.00	22411.46	3228.93	16739.00	19900.00	24444.00	24970.00	25500.00
		123.00	1.00	23600.00	NaN	23600.00	23600.00	23600.00	23600.00	23600.00
		124.00	18.00	24496.78	1353.87	21386.00	23900.00	25215.00	25410.00	25489.00
		125.00	38.00	23462.84	2320.81	14980.00	23521.00	24288.00	24683.75	25539.00
		126.00	8.00	25166.12	7528.67	14890.00	18024.25	26700.00	30350.00	35000.00
		127.00	7.00	19926.71	3470.03	16000.00	17744.50	19500.00	20999.00	26500.00
		128.00	6.00	29716.67	7341.50	18500.00	25400.00	31200.00	34750.00	38000.00
		130.00	1.00	16999.00	NaN	16999.00	16999.00	16999.00	16999.00	16999.00
		134.00	6.00	22083.33	832.27	21100.00	21375.00	22200.00	22762.50	22950.00
		135.00	1.00	23650.00	NaN	23650.00	23650.00	23650.00	23650.00	23650.00
		137.00	1.00	14990.00	NaN	14990.00	14990.00	14990.00	14990.00	14990.00
		146.00	1.00	25600.00	NaN	25600.00	25600.00	25600.00	25600.00	25600.00
		149.00	1.00	58990.00	NaN	58990.00	58990.00	58990.00	58990.00	58990.00
		188.00	3.00	60866.67	11935.38	53000.00	54000.00	55000.00	64800.00	74600.00
		189.00	14.00	52127.79	6370.69	41000.00	49925.00	51949.50	56425.00	64900.00
		194.00	1.00	62900.00	NaN	62900.00	62900.00	62900.00	62900.00	62900.00
		990.00	1.00	23500.00	NaN	23500.00	23500.00	23500.00	23500.00	23500.00
Station wagon		1.00	2.00	18350.00	212.13	18200.00	18275.00	18350.00	18425.00	18500.00

make_model	body_type	CO2_Emission	count	mean	std	min	25%	50%	75%	max
			10.00	4.00	16743.50	3126.83	12995.00	14858.75	16990.00	18874.75
Opel Astra	Compact	11.00	2.00	18675.00	3924.44	15900.00	17287.50	18675.00	20062.50	21450.00
		88.00	1.00	15990.00	NaN	15990.00	15990.00	15990.00	15990.00	15990.00
		99.00	17.00	16322.29	2623.96	12900.00	13900.00	15990.00	17500.00	21800.00
		101.00	11.00	13970.00	1444.85	11790.00	13290.00	13900.00	14955.00	15950.00
		103.00	10.00	24145.50	3645.70	17500.00	21098.75	25775.00	26975.00	27225.00
		104.00	15.00	21134.60	2531.07	15990.00	19499.50	20890.00	23175.00	24900.00
		105.00	8.00	17831.12	5870.33	11990.00	14524.25	15815.00	19460.00	26990.00
		106.00	11.00	20441.36	2385.84	15380.00	19222.50	21200.00	22045.00	23250.00
		107.00	13.00	20261.31	2533.07	16999.00	18680.00	19199.00	21900.00	25740.00
		108.00	5.00	19260.00	3603.37	14990.00	18450.00	18890.00	18980.00	24990.00
		109.00	21.00	18758.05	2301.71	14590.00	16980.00	18480.00	19950.00	22890.00
		110.00	46.00	20032.98	3093.55	12990.00	18425.00	19290.00	21757.50	26990.00
		111.00	5.00	18184.00	2688.10	14550.00	16990.00	17900.00	19990.00	21490.00
		113.00	3.00	19733.33	3527.51	17500.00	17700.00	17900.00	20850.00	23800.00
		114.00	52.00	23320.63	1361.67	18490.00	22449.75	23497.50	24106.25	25475.00
		115.00	1.00	21950.00	NaN	21950.00	21950.00	21950.00	21950.00	21950.00
		116.00	9.00	17635.56	2961.45	13500.00	15900.00	16990.00	18490.00	23290.00
		117.00	17.00	24798.18	2825.36	15000.00	24420.00	25420.00	25990.00	27400.00
		118.00	7.00	22217.14	3537.50	16400.00	19980.00	23490.00	24935.00	25800.00
		119.00	3.00	19120.00	2328.69	16980.00	17880.00	18780.00	20190.00	21600.00
		121.00	7.00	20878.14	3460.49	16980.00	17894.50	21449.00	23219.50	25490.00
		124.00	3.00	24090.00	655.74	23490.00	23740.00	23990.00	24390.00	24790.00
		125.00	2.00	25990.00	0.00	25990.00	25990.00	25990.00	25990.00	25990.00
		127.00	6.00	21917.50	8025.93	5555.00	24990.00	24990.00	24990.00	25990.00
		189.00	1.00	63900.00	NaN	63900.00	63900.00	63900.00	63900.00	63900.00
Vauxhall Corsa	Hatchback	10.00	2.00	18964.50	20.51	18950.00	18957.25	18964.50	18971.75	18979.00
		88.00	6.00	11115.00	684.35	10445.00	10946.25	10950.00	10950.00	12450.00
		90.00	1.00	10490.00	NaN	10490.00	10490.00	10490.00	10490.00	10490.00
		95.00	1.00	11980.00	NaN	11980.00	11980.00	11980.00	11980.00	11980.00
		96.00	3.00	16533.33	1053.96	15900.00	15925.00	15950.00	16850.00	17750.00
		97.00	30.00	12799.63	1079.98	9490.00	12636.00	12955.00	12955.00	14900.00
		98.00	1.00	10980.00	NaN	10980.00	10980.00	10980.00	10980.00	10980.00
		99.00	2.00	15972.00	38.18	15945.00	15958.50	15972.00	15985.50	15999.00
		104.00	94.00	17243.46	6482.05	8450.00	13996.00	16421.50	17800.00	39433.00
		107.00	6.00	16353.33	3559.93	14900.00	14900.00	14900.00	14900.00	23620.00
		115.00	7.00	14347.00	1165.14	13899.00	13899.00	13899.00	13922.00	16989.00
		117.00	16.00	12980.31	1669.06	11955.00	11955.00	11955.00	14240.00	17000.00
		119.00	6.00	14388.00	1374.63	12490.00	13369.25	14729.50	15294.75	15980.00
		124.00	1.00	14999.00	NaN	14999.00	14999.00	14999.00	14999.00	14999.00
		127.00	1.00	29526.00	NaN	29526.00	29526.00	29526.00	29526.00	29526.00
		129.00	4.00	26061.75	1674.50	23550.00	26061.75	26899.00	26899.00	26899.00
		139.00	1.00	25290.00	NaN	25290.00	25290.00	25290.00	25290.00	25290.00

make_model	body_type	CO2_Emission	count	mean	std	min	25%	50%	75%	max
			149.00	2.00	34447.50	5016.92	30900.00	32673.75	34447.50	36221.25
Coupe	151.00	1.00	36950.00	NaN	36950.00	36950.00	36950.00	36950.00	36950.00	36950.00
Off-Road	134.00	1.00	29990.00	NaN	29990.00	29990.00	29990.00	29990.00	29990.00	29990.00
Sedans	154.00	1.00	14490.00	NaN	14490.00	14490.00	14490.00	14490.00	14490.00	14490.00
128.00	1.00	18590.00	NaN	18590.00	18590.00	18590.00	18590.00	18590.00	18590.00	18590.00
0.00	1.00	17850.00	NaN	17850.00	17850.00	17850.00	17850.00	17850.00	17850.00	17850.00
1.00	4.00	22527.50	1173.10	21445.00	22000.00	22235.00	22762.50	24195.00	24195.00	24195.00
5.00	1.00	6950.00	NaN	6950.00	6950.00	6950.00	6950.00	6950.00	6950.00	6950.00
10.00	65.00	14287.02	2110.02	9990.00	12940.00	14740.00	15280.00	18790.00	18790.00	18790.00
12.09	1.00	14990.00	NaN	14990.00	14990.00	14990.00	14990.00	14990.00	14990.00	14990.00
17.00	2.00	15980.00	1428.36	14970.00	15475.00	15980.00	16485.00	16990.00	16990.00	16990.00
88.00	7.00	12027.14	2751.66	7800.00	10050.00	12990.00	13950.00	15400.00	15400.00	15400.00
90.00	17.00	12106.47	2071.55	9900.00	10890.00	11740.00	12590.00	17740.00	17740.00	17740.00
91.00	2.00	11145.00	2609.22	9300.00	10222.50	11145.00	12067.50	12990.00	12990.00	12990.00
93.00	56.00	12173.04	1607.15	8900.00	11140.00	11990.00	12695.00	15400.00	15400.00	15400.00
94.00	1.00	10450.00	NaN	10450.00	10450.00	10450.00	10450.00	10450.00	10450.00	10450.00
95.00	12.00	11847.92	1577.95	9290.00	10960.00	11360.00	12161.25	14970.00	14970.00	14970.00
96.00	5.00	13018.00	2236.66	10400.00	12350.00	12360.00	13490.00	16490.00	16490.00	16490.00
97.00	28.00	11160.86	1774.51	8490.00	9893.75	10965.00	11772.50	14900.00	14900.00	14900.00
98.00	2.00	10980.00	0.00	10980.00	10980.00	10980.00	10980.00	10980.00	10980.00	10980.00
99.00	15.00	13906.60	2710.55	9990.00	11575.00	14490.00	15990.00	18290.00	18290.00	18290.00
101.00	1.00	14299.00	NaN	14299.00	14299.00	14299.00	14299.00	14299.00	14299.00	14299.00
103.00	5.00	13528.00	3801.93	8950.00	10400.00	14990.00	15000.00	18300.00	18300.00	18300.00
104.00	47.00	14536.00	1915.44	8500.00	13730.00	14490.00	15522.50	18990.00	18990.00	18990.00
105.00	2.00	11240.00	2036.47	9800.00	10520.00	11240.00	11960.00	12680.00	12680.00	12680.00
106.00	1.00	10950.00	NaN	10950.00	10950.00	10950.00	10950.00	10950.00	10950.00	10950.00
107.00	94.00	15266.07	2980.43	8500.00	13194.75	16440.00	17142.25	18990.00	18990.00	18990.00
110.00	8.00	17023.50	1399.76	14990.00	16082.00	17195.00	17740.00	18980.00	18980.00	18980.00
111.00	4.00	14165.00	2475.34	10480.00	13855.00	15240.00	15550.00	15700.00	15700.00	15700.00
113.00	1.00	18900.00	NaN	18900.00	18900.00	18900.00	18900.00	18900.00	18900.00	18900.00
114.00	9.00	16526.67	4653.09	11700.00	14490.00	16900.00	16990.00	17690.00	17690.00	17690.00
115.00	33.00	15916.30	1841.00	10350.00	14958.00	15990.00	17105.00	18980.00	18980.00	

			count	mean	std	min	25%	50%	75%	max
make_model	body_type	CO2_Emission								
		127.00	46.00	18474.35	3410.30	13490.00	16372.50	17865.00	18932.50	29850.00
		128.00	81.00	14065.56	3037.15	10490.00	10990.00	14693.00	15380.00	26590.00
		129.00	16.00	23652.81	4928.06	17890.00	18516.25	24390.00	26990.00	32950.00
		130.00	41.00	19328.49	5089.16	13100.00	13750.00	18690.00	23400.00	30895.00
		133.00	14.00	17443.93	1518.00	13900.00	17912.50	17962.50	18365.00	18790.00
		134.00	18.00	24809.39	2583.90	18225.00	23790.00	23940.00	26632.50	28625.00
		135.00	10.00	20838.20	2458.67	17990.00	18534.75	20674.00	22730.00	24690.00
		136.00	1.00	25490.00	NaN	25490.00	25490.00	25490.00	25490.00	25490.00
		138.00	9.00	17659.44	1536.76	15100.00	17415.00	17950.00	18950.00	18990.00
		139.00	20.00	24594.35	2255.21	20989.00	22776.75	23940.00	25990.00	29989.00
		141.00	7.00	18680.00	8031.79	13400.00	13690.00	13700.00	22220.00	31840.00
		144.00	1.00	18490.00	NaN	18490.00	18490.00	18490.00	18490.00	18490.00
		146.00	5.00	28552.00	2307.22	24950.00	27940.00	28980.00	29900.00	30990.00
		148.00	2.00	16949.00	70.71	16899.00	16924.00	16949.00	16974.00	16999.00
		149.00	5.00	20143.80	9239.12	10880.00	12500.00	17600.00	28989.00	30750.00
		150.00	1.00	14600.00	NaN	14600.00	14600.00	14600.00	14600.00	14600.00
		151.00	7.00	28356.43	3468.74	24195.00	24940.00	30650.00	30915.00	31940.00
		155.00	3.00	18656.67	577.35	17990.00	18490.00	18990.00	18990.00	18990.00
		158.00	2.00	19370.00	12190.52	10750.00	15060.00	19370.00	23680.00	27990.00
		167.00	1.00	12340.00	NaN	12340.00	12340.00	12340.00	12340.00	12340.00
		168.00	1.00	31890.00	NaN	31890.00	31890.00	31890.00	31890.00	31890.00
		170.00	2.00	24750.00	0.00	24750.00	24750.00	24750.00	24750.00	24750.00
Station wagon		1.00	61.00	15722.36	2915.53	10450.00	14000.00	15900.00	16980.00	29990.00
		9.00	48.00	12429.25	2366.39	8490.00	10487.50	12425.00	14667.50	16050.00
		10.00	9.00	14665.11	1163.51	12985.00	13490.00	14980.00	14990.00	16666.00
		11.00	11.00	14460.91	3828.30	9000.00	11675.00	12450.00	17990.00	18890.00
		12.09	2.00	17850.00	0.00	17850.00	17850.00	17850.00	17850.00	17850.00
		13.00	1.00	15455.00	NaN	15455.00	15455.00	15455.00	15455.00	15455.00
		14.00	1.00	18380.00	NaN	18380.00	18380.00	18380.00	18380.00	18380.00
		15.00	5.00	13270.80	1498.27	10950.00	12974.00	13450.00	13990.00	14990.00
		80.00	1.00	23200.00	NaN	23200.00	23200.00	23200.00	23200.00	23200.00
		87.00	1.00	9450.00	NaN	9450.00	9450.00	9450.00	9450.00	9450.00
		89.00	7.00	11923.57	756.21	10980.00	11450.00	11500.00	12572.50	12940.00
		90.00	1.00	10900.00	NaN	10900.00	10900.00	10900.00	10900.00	10900.00
		93.00	10.00	12015.00	1564.18	9800.00	11202.50	12205.00	12475.00	15240.00
		94.00	8.00	10466.25	1106.06	8900.00	9715.00	10440.00	11015.00	11990.00
		95.00	121.00	11682.83	1715.36	7900.00	10500.00	11570.00	12660.00	15450.00
		96.00	12.00	12328.83	2187.10	8495.00	10979.75	12174.50	13540.50	15450.00
		97.00	41.00	11149.98	2222.14	6690.00	9490.00	10900.00	11990.00	15950.00
		98.00	25.00	9402.00	1216.98	6990.00	8450.00	9190.00	10450.00	12299.00
		99.00	10.00	10900.40	1385.71	8900.00	10263.00	10450.00	11660.00	13900.00
		100.00	5.00	13276.00	2604.72	10950.00	12390.00	12390.00	12900.00	17750.00
		101.00	25.00	12652.96	3426.31	255.00	10990.00	14490.00	14900.00	15400.00

make_model	body_type	CO2_Emission	count	mean	std	min	25%	50%	75%	max
			103.00	14.00	12369.71	3595.94	7690.00	9605.00	10915.00	15427.50
		104.00	41.00	13218.54	2248.86	6990.00	11990.00	12990.00	14900.00	17500.00
		105.00	8.00	12378.12	3594.26	8680.00	9260.00	11810.00	15258.75	16950.00
		106.00	1.00	10900.00	NaN	10900.00	10900.00	10900.00	10900.00	10900.00
		107.00	23.00	17166.91	1038.95	14900.00	16566.00	17450.00	17990.00	18450.00
		109.00	2.00	8990.00	2107.18	7500.00	8245.00	8990.00	9735.00	10480.00
		110.00	1.00	17970.00	NaN	17970.00	17970.00	17970.00	17970.00	17970.00
		111.00	2.00	13920.00	1456.64	12890.00	13405.00	13920.00	14435.00	14950.00
		114.00	14.00	17035.57	1540.71	12800.00	16589.25	17185.00	17995.00	18950.00
		115.00	4.00	15250.00	2688.08	12980.00	12980.00	14885.00	17155.00	18250.00
		116.00	12.00	17381.92	1138.28	14999.00	16914.25	17689.50	18050.00	18790.00
		117.00	228.00	14690.85	4804.88	6480.00	10500.00	14900.00	18190.00	31125.00
		119.00	152.00	15541.66	2636.42	6000.00	13999.75	15525.00	16992.00	27453.00
		120.00	1.00	9800.00	NaN	9800.00	9800.00	9800.00	9800.00	9800.00
		121.00	25.00	15732.32	2925.24	9999.00	14950.00	15900.00	18490.00	18990.00
		123.00	1.00	28590.00	NaN	28590.00	28590.00	28590.00	28590.00	28590.00
		124.00	9.00	19380.00	2801.73	17877.00	17877.00	17877.00	18260.00	24960.00
		125.00	51.00	19018.63	2942.35	14000.00	17559.50	18500.00	18989.00	28590.00
		126.00	16.00	22546.88	3791.72	14650.00	21450.00	22422.50	23740.00	31950.00
		127.00	30.00	16098.13	3963.21	9500.00	13174.25	17992.00	18957.00	23490.00
		128.00	85.00	18452.89	2687.58	15110.00	16990.00	17994.00	18850.00	33095.00
		129.00	3.00	24966.67	2628.81	21990.00	23965.00	25940.00	26455.00	26970.00
		130.00	38.00	19932.24	4691.16	11990.00	17150.00	18935.00	21842.25	29750.00
		131.00	2.00	13073.00	3354.51	10701.00	11887.00	13073.00	14259.00	15445.00
		133.00	5.00	13722.00	3957.03	8950.00	10490.00	14990.00	15490.00	18690.00
		134.00	17.00	27513.65	2929.61	22950.00	25575.00	26780.00	29950.00	33470.00
		135.00	11.00	23289.82	3272.44	16489.00	21686.50	23505.00	26441.00	26980.00
		136.00	4.00	16852.50	1417.38	14990.00	16490.00	16990.00	17352.50	18440.00
		138.00	13.00	25403.31	4527.11	18096.00	22995.00	25980.00	28940.00	30995.00
		139.00	2.00	23157.50	4712.87	19825.00	21491.25	23157.50	24823.75	26490.00
		141.00	9.00	21464.33	5912.30	17490.00	18355.00	18890.00	18965.00	32440.00
		144.00	2.00	30939.50	3465.53	28489.00	29714.25	30939.50	32164.75	33390.00
		145.00	3.00	9756.67	635.16	9290.00	9395.00	9500.00	9990.00	10480.00
		146.00	1.00	14900.00	NaN	14900.00	14900.00	14900.00	14900.00	14900.00
		147.00	1.00	9790.00	NaN	9790.00	9790.00	9790.00	9790.00	9790.00
		149.00	14.00	21372.86	10073.34	10480.00	10957.25	23335.00	29615.00	34580.00
		151.00	5.00	31753.80	2778.72	27989.00	29900.00	32590.00	33390.00	34900.00
		154.00	22.00	25869.32	7808.99	10350.00	25881.25	27070.00	30950.00	33995.00
		156.00	1.00	9990.00	NaN	9990.00	9990.00	9990.00	9990.00	9990.00
		158.00	2.00	14744.50	347.19	14499.00	14621.75	14744.50	14867.25	14990.00
		159.00	1.00	17890.00	NaN	17890.00	17890.00	17890.00	17890.00	17890.00
		160.00	1.00	25990.00	NaN	25990.00	25990.00	25990.00	25990.00	25990.00
		170.00	2.00	25550.00	0.00	25550.00	25550.00	25550.00	25550.00	25550.00

make_model	body_type	CO2_Emission	count	mean	std	min	25%	50%	75%	max
			174.00	1.00	12690.00	NaN	12690.00	12690.00	12690.00	12690.00
Opel Corsa	Compact	1.00	4.00	10785.00	1871.34	9800.00	9800.00	9875.00	10860.00	13590.00
		8.00	3.00	10266.33	1184.31	8900.00	9900.00	10900.00	10949.50	10999.00
		10.00	4.00	6777.50	1220.83	5300.00	6012.50	7015.00	7780.00	7780.00
		11.00	37.00	12498.30	1455.39	9690.00	11220.00	12620.00	13455.00	15990.00
		12.32	1.00	10950.00	NaN	10950.00	10950.00	10950.00	10950.00	10950.00
		13.00	35.00	10490.57	1524.32	6890.00	10250.00	10490.00	10990.00	16791.00
		14.00	15.00	15155.80	1408.45	12990.00	14490.00	14960.00	15991.00	17490.00
		15.00	1.00	13750.00	NaN	13750.00	13750.00	13750.00	13750.00	13750.00
		51.00	1.00	9900.00	NaN	9900.00	9900.00	9900.00	9900.00	9900.00
		84.00	2.00	9719.00	380.42	9450.00	9584.50	9719.00	9853.50	9988.00
		85.00	1.00	7950.00	NaN	7950.00	7950.00	7950.00	7950.00	7950.00
		87.00	1.00	7800.00	NaN	7800.00	7800.00	7800.00	7800.00	7800.00
		90.00	1.00	8450.00	NaN	8450.00	8450.00	8450.00	8450.00	8450.00
		100.00	21.00	7901.33	595.94	6780.00	7450.00	7950.00	8500.00	8850.00
		101.00	2.00	7324.50	460.33	6999.00	7161.75	7324.50	7487.25	7650.00
		103.00	1.00	7780.00	NaN	7780.00	7780.00	7780.00	7780.00	7780.00
		104.00	1.00	8900.00	NaN	8900.00	8900.00	8900.00	8900.00	8900.00
		107.00	7.00	6442.14	2787.80	120.00	7495.00	7495.00	7495.00	7500.00
		110.00	67.00	13245.90	1928.58	9470.00	12310.00	12950.00	13965.00	18501.00
		115.00	2.00	10940.00	1470.78	9900.00	10420.00	10940.00	11460.00	11980.00
		116.00	3.00	12277.00	1145.36	11490.00	11620.00	11750.00	12670.50	13591.00
		117.00	1.00	8990.00	NaN	8990.00	8990.00	8990.00	8990.00	8990.00
		118.00	11.00	9627.27	679.18	7600.00	9725.00	9800.00	9940.00	9940.00
		119.00	4.00	11127.50	1860.67	9500.00	9710.00	10765.00	12182.50	13480.00
		120.00	136.00	9296.53	1557.41	7599.00	8490.00	8900.00	9622.50	17490.00
		121.00	7.00	9985.00	2100.68	7190.00	8984.50	9890.00	10448.00	13950.00
		123.00	60.00	9767.97	1737.44	4990.00	8950.00	9763.50	9800.00	14450.00
		124.00	12.00	9325.75	1384.28	6900.00	8575.00	8985.00	10282.50	11200.00
		125.00	1.00	16690.00	NaN	16690.00	16690.00	16690.00	16690.00	16690.00
		126.00	54.00	9366.22	1953.39	6660.00	7455.00	9460.00	10956.75	15490.00
		128.00	87.00	8306.98	1395.50	6290.00	7469.50	7885.00	8940.00	11390.00
		129.00	207.00	10018.06	2435.61	331.00	7950.00	9990.00	10989.00	18622.00
		130.00	2.00	10897.50	137.89	10800.00	10848.75	10897.50	10946.25	10995.00
		131.00	8.00	10354.75	662.60	9788.00	9910.00	9950.00	10965.00	11290.00
		133.00	20.00	10010.70	1707.99	8600.00	8800.00	9425.00	10892.50	15980.00
		134.00	37.00	10695.00	382.86	9790.00	10689.00	10689.00	10890.00	11333.00
		135.00	8.00	12885.38	1904.60	9990.00	12060.00	13540.00	14037.00	14825.00
		136.00	40.00	13975.75	2397.12	8700.00	13480.00	14860.00	15515.00	16490.00
		137.00	47.00	13197.68	1129.09	10450.00	12820.00	13500.00	13944.50	14710.00
		139.00	42.00	13187.62	1701.73	9900.00	11990.00	12945.00	13990.00	17091.00
		140.00	109.00	15157.80	1620.48	11190.00	13950.00	15440.00	16440.00	18480.00
		141.00	3.00	10911.00	228.63	10779.00	10779.00	10779.00	10977.00	11175.00

make_model	body_type	CO2_Emission	count	mean	std	min	25%	50%	75%	max
		143.00	114.00	15337.82	1299.48	10750.00	14213.00	15490.00	16290.00	17990.00
		146.00	1.00	14250.00	NaN	14250.00	14250.00	14250.00	14250.00	14250.00
		149.00	21.00	14257.86	1258.95	10990.00	13490.00	14450.00	14980.00	15990.00
		150.00	41.00	14886.49	1437.90	12376.00	13890.00	13990.00	15975.00	17777.00
		151.00	1.00	10720.00	NaN	10720.00	10720.00	10720.00	10720.00	10720.00
		153.00	1.00	14480.00	NaN	14480.00	14480.00	14480.00	14480.00	14480.00
		155.00	2.00	14750.00	0.00	14750.00	14750.00	14750.00	14750.00	14750.00
		156.00	1.00	9799.00	NaN	9799.00	9799.00	9799.00	9799.00	9799.00
		157.00	15.00	15484.27	1953.76	10990.00	15690.00	15890.00	16390.50	17491.00
		158.00	11.00	16042.00	262.04	15889.00	15889.00	15889.00	16169.50	16450.00
		159.00	2.00	15240.00	353.55	14990.00	15115.00	15240.00	15365.00	15490.00
		165.00	1.00	13890.00	NaN	13890.00	13890.00	13890.00	13890.00	13890.00
		167.00	1.00	13890.00	NaN	13890.00	13890.00	13890.00	13890.00	13890.00
		170.00	1.00	14480.00	NaN	14480.00	14480.00	14480.00	14480.00	14480.00
Coupe		8.00	1.00	10500.00	NaN	10500.00	10500.00	10500.00	10500.00	10500.00
		99.00	1.00	7200.00	NaN	7200.00	7200.00	7200.00	7200.00	7200.00
		101.00	1.00	8800.00	NaN	8800.00	8800.00	8800.00	8800.00	8800.00
		113.00	1.00	10950.00	NaN	10950.00	10950.00	10950.00	10950.00	10950.00
		114.00	1.00	7800.00	NaN	7800.00	7800.00	7800.00	7800.00	7800.00
		116.50	3.00	9863.33	2047.45	7500.00	9245.00	10990.00	11045.00	11100.00
		119.00	1.00	6900.00	NaN	6900.00	6900.00	6900.00	6900.00	6900.00
		124.00	4.00	8075.00	675.15	7200.00	7725.00	8200.00	8550.00	8700.00
Off-Road		119.00	1.00	8700.00	NaN	8700.00	8700.00	8700.00	8700.00	8700.00
		120.00	2.00	7900.00	0.00	7900.00	7900.00	7900.00	7900.00	7900.00
Sedans		8.00	4.00	9150.00	1112.06	8000.00	8300.00	9200.00	10050.00	10200.00
		10.00	1.00	7499.00	NaN	7499.00	7499.00	7499.00	7499.00	7499.00
		11.00	22.00	11154.27	2182.39	7200.00	9275.00	11650.00	12496.75	15690.00
		13.00	7.00	11383.57	3428.79	7400.00	8740.50	10590.00	13912.00	16390.00
		14.00	9.00	12954.00	2674.60	7490.00	11990.00	12500.00	14489.00	16940.00
		87.00	2.00	7750.00	212.13	7600.00	7675.00	7750.00	7825.00	7900.00
		89.00	1.00	7395.00	NaN	7395.00	7395.00	7395.00	7395.00	7395.00
		90.00	1.00	9250.00	NaN	9250.00	9250.00	9250.00	9250.00	9250.00
		94.00	1.00	4950.00	NaN	4950.00	4950.00	4950.00	4950.00	4950.00
		96.00	1.00	7899.00	NaN	7899.00	7899.00	7899.00	7899.00	7899.00
		98.00	1.00	7800.00	NaN	7800.00	7800.00	7800.00	7800.00	7800.00
		101.00	11.00	7867.18	1070.91	5499.00	7375.00	7750.00	8850.00	9200.00
		104.00	4.00	7660.00	640.36	6990.00	7297.50	7575.00	7937.50	8500.00
		105.00	2.00	8049.50	778.52	7499.00	7774.25	8049.50	8324.75	8600.00
		107.00	11.00	7452.73	1065.86	6200.00	6695.00	7490.00	7925.00	9500.00
		108.00	3.00	7766.67	275.38	7450.00	7675.00	7900.00	7925.00	7950.00
		109.00	1.00	11240.00	NaN	11240.00	11240.00	11240.00	11240.00	11240.00
		110.00	28.00	11340.32	2107.56	7500.00	10172.50	11935.00	12922.50	13990.00
		113.00	12.00	9441.67	914.74	7500.00	9300.00	9300.00	9600.00	10950.00

			count	mean	std	min	25%	50%	75%	max
make_model	body_type	CO2_Emission								
Opel Insignia	Stationer	114.00	1.00	7390.00	NaN	7390.00	7390.00	7390.00	7390.00	7390.00
		115.00	1.00	9000.00	NaN	9000.00	9000.00	9000.00	9000.00	9000.00
		116.00	1.00	12980.00	NaN	12980.00	12980.00	12980.00	12980.00	12980.00
		118.00	28.00	9762.14	182.72	9400.00	9612.50	9890.00	9900.00	9950.00
		119.00	1.00	13470.00	NaN	13470.00	13470.00	13470.00	13470.00	13470.00
		120.00	60.00	8932.70	1155.12	6499.00	7949.00	8950.00	9812.50	11290.00
		121.00	8.00	12251.25	1920.23	8750.00	10822.50	12935.00	13900.00	13980.00
		123.00	16.00	11973.88	1957.91	8299.00	11630.00	12550.00	13115.00	13990.00
		124.00	316.00	9363.99	1731.46	5890.00	7950.00	8900.00	10742.50	16290.00
		126.00	71.00	8633.38	1367.91	5970.00	7590.00	8750.00	9849.00	11300.00
		127.00	3.00	8773.33	340.64	8380.00	8675.00	8970.00	8970.00	8970.00
		128.00	41.00	9164.07	2341.00	13.00	7800.00	8950.00	10990.00	13990.00
		129.00	30.00	8573.53	1439.14	6450.00	7660.00	8249.00	8990.00	11400.00
		130.00	17.00	9210.12	1012.60	7990.00	8650.00	8990.00	9500.00	11280.00
		131.00	18.00	10268.00	1349.00	7500.00	9612.50	10970.00	11267.25	11399.00
		133.00	4.00	12932.25	2394.32	10989.00	10989.75	12420.00	14362.50	15900.00
		135.00	1.00	12400.00	NaN	12400.00	12400.00	12400.00	12400.00	12400.00
		136.00	2.00	11420.00	4341.64	8350.00	9885.00	11420.00	12955.00	14490.00
		137.00	18.00	12277.50	1730.25	7900.00	11375.00	12445.00	13857.50	14300.00
		139.00	18.00	12387.00	1446.86	9200.00	11525.00	11990.00	13612.50	14900.00
		140.00	11.00	16293.64	1957.12	12990.00	14720.00	16440.00	17995.00	18490.00
		141.00	2.00	9990.00	0.00	9990.00	9990.00	9990.00	9990.00	9990.00
		143.00	43.00	15430.49	1936.75	9590.00	14473.50	15450.00	16780.00	18490.00
		149.00	30.00	14004.70	1427.01	10000.00	13154.75	13925.00	14666.25	16480.00
		150.00	9.00	15048.78	2399.47	9999.00	13950.00	16250.00	16670.00	17290.00
		156.00	1.00	16490.00	NaN	16490.00	16490.00	16490.00	16490.00	16490.00
		158.00	2.00	15390.00	0.00	15390.00	15390.00	15390.00	15390.00	15390.00
	Transporter	100.00	2.00	5350.00	141.42	5250.00	5300.00	5350.00	5400.00	5450.00
		101.00	1.00	5600.00	NaN	5600.00	5600.00	5600.00	5600.00	5600.00
		112.50	1.00	7450.00	NaN	7450.00	7450.00	7450.00	7450.00	7450.00
		124.00	3.00	9933.33	493.29	9600.00	9650.00	9700.00	10100.00	10500.00
	Opel Insignia	126.00	2.00	7900.00	0.00	7900.00	7900.00	7900.00	7900.00	7900.00
		99.00	1.00	14900.00	NaN	14900.00	14900.00	14900.00	14900.00	14900.00
		104.00	1.00	13900.00	NaN	13900.00	13900.00	13900.00	13900.00	13900.00
		114.00	3.00	18430.00	1752.91	16490.00	17695.00	18900.00	19400.00	19900.00
		118.00	1.00	21900.00	NaN	21900.00	21900.00	21900.00	21900.00	21900.00
		124.00	2.00	10350.00	0.00	10350.00	10350.00	10350.00	10350.00	10350.00
		130.00	11.00	36471.64	6823.31	20900.00	35242.50	36200.00	38834.50	49884.00
		134.00	1.00	21300.00	NaN	21300.00	21300.00	21300.00	21300.00	21300.00
		135.00	1.00	38995.00	NaN	38995.00	38995.00	38995.00	38995.00	38995.00
		138.00	1.00	26990.00	NaN	26990.00	26990.00	26990.00	26990.00	26990.00
		140.00	1.00	39490.00	NaN	39490.00	39490.00	39490.00	39490.00	39490.00
		145.00	1.00	25900.00	NaN	25900.00	25900.00	25900.00	25900.00	25900.00

make_model	body_type	CO2_Emission	count	mean	std	min	25%	50%	75%	max
			146.00	1.00	39990.00	NaN	39990.00	39990.00	39990.00	39990.00
BMW 3 Series	Coupe	147.00	1.00	13490.00	NaN	13490.00	13490.00	13490.00	13490.00	13490.00
		153.00	1.00	37899.00	NaN	37899.00	37899.00	37899.00	37899.00	37899.00
		137.00	1.00	17094.00	NaN	17094.00	17094.00	17094.00	17094.00	17094.00
BMW X5	Off-Road	131.00	1.00	33490.00	NaN	33490.00	33490.00	33490.00	33490.00	33490.00
		164.00	5.00	31983.80	2288.44	28500.00	31505.00	32345.00	32793.00	34776.00
		169.00	1.00	12750.00	NaN	12750.00	12750.00	12750.00	12750.00	12750.00
BMW 5 Series	Sedans	13.00	6.00	19561.67	4726.89	13900.00	16367.50	19495.00	21497.50	26990.00
		13.98	1.00	19950.00	NaN	19950.00	19950.00	19950.00	19950.00	19950.00
		14.00	10.00	21953.50	2674.38	18580.00	19960.00	21135.00	23490.00	26890.00
BMW 7 Series	Sedans	45.00	1.00	33950.00	NaN	33950.00	33950.00	33950.00	33950.00	33950.00
		98.00	1.00	8600.00	NaN	8600.00	8600.00	8600.00	8600.00	8600.00
		99.00	28.00	12191.18	2372.70	9650.00	10950.00	10990.00	13092.50	18333.00
BMW 1 Series	Sedans	101.00	4.00	14119.25	668.86	13540.00	13540.00	14119.00	14698.25	14699.00
		104.00	33.00	12746.85	3270.97	9850.00	11490.00	12490.00	13500.00	29200.00
		105.00	1.00	17450.00	NaN	17450.00	17450.00	17450.00	17450.00	17450.00
BMW 3 Series	Sedans	109.00	8.00	15016.25	3786.68	10400.00	12487.50	13245.00	18848.75	19895.00
		110.00	2.00	16449.50	3605.54	13900.00	15174.75	16449.50	17724.25	18999.00
		111.00	1.00	18880.00	NaN	18880.00	18880.00	18880.00	18880.00	18880.00
BMW 2 Series	Sedans	113.00	1.00	22280.00	NaN	22280.00	22280.00	22280.00	22280.00	22280.00
		114.00	61.00	18372.85	2159.95	12499.00	17450.00	18690.00	19990.00	22350.00
		116.00	9.00	26352.22	2918.57	22800.00	25295.00	25625.00	28525.00	31990.00
BMW 4 Series	Sedans	118.00	38.00	17206.32	2498.43	13500.00	15990.00	16490.00	17950.00	27490.00
		119.00	1.00	14990.00	NaN	14990.00	14990.00	14990.00	14990.00	14990.00
		120.00	1.00	29990.00	NaN	29990.00	29990.00	29990.00	29990.00	29990.00
BMW 5 Series	Sedans	121.00	2.00	30695.00	1831.41	29400.00	30047.50	30695.00	31342.50	31990.00
		124.00	22.00	12862.73	3243.06	10350.00	11950.00	12450.00	12450.00	25990.00
		126.00	47.00	23348.55	5728.91	15790.00	18780.00	21704.00	25568.00	37990.00
BMW 6 Series	Sedans	128.00	1.00	22120.00	NaN	22120.00	22120.00	22120.00	22120.00	22120.00
		129.00	51.00	16999.24	5339.52	10500.00	12347.50	16790.00	18945.00	31990.00
		130.00	18.00	18722.44	4102.67	13995.00	16350.00	16850.00	20485.00	32490.00
BMW 7 Series	Sedans	133.00	222.00	21518.32	7241.85	9900.00	17900.00	19490.00	24418.25	49350.00
		134.00	24.00	22216.29	5428.15	13900.00	19355.00	21480.00	22214.00	37990.00
		135.00	16.00	28677.31	7343.00	17989.00	23124.00	27570.00	34163.75	39690.00
BMW 8 Series	Sedans	136.00	50.00	20847.48	3743.40	16650.00	18510.00	19985.00	20990.00	33900.00
		137.00	11.00	26167.27	7512.21	13850.00	20515.00	28085.00	30700.00	37790.00
		138.00	42.00	25623.62	5294.91	18750.00	21990.00	23720.00	29937.50	37950.00
BMW 2 Series	Sedans	139.00	13.00	27074.15	3493.78	20480.00	25464.00	26511.00	28315.00	32525.00
		140.00	5.00	23544.00	7660.89	17550.00	17990.00	18890.00	28900.00	34390.00
		141.00	22.00	27602.45	8220.52	16550.00	23229.25	24440.00	34865.00	40670.00
BMW 3 Series	Sedans	143.00	11.00	18398.27	5347.30	13990.00	15475.00	16490.00	17485.00	28989.00
		144.00	32.00	21757.94	3387.01	17480.00	19912.50	21220.00	21957.50	33940.00
		145.00	28.00	28593.71	8573.02	16950.00	20945.00	23945.00	38450.00	40990.00

			count	mean	std	min	25%	50%	75%	max
make_model	body_type	CO2_Emission								
		146.00	12.00	29976.67	6214.69	22490.00	24117.50	29722.50	34931.25	39990.00
		147.00	27.00	21304.93	9824.10	12100.00	13150.00	15970.00	24370.00	39989.00
		148.00	1.00	33990.00	NaN	33990.00	33990.00	33990.00	33990.00	33990.00
		149.00	1.00	33990.00	NaN	33990.00	33990.00	33990.00	33990.00	33990.00
		150.00	3.00	31653.00	10545.08	19480.00	28485.00	37490.00	37739.50	37989.00
		153.00	1.00	38480.00	NaN	38480.00	38480.00	38480.00	38480.00	38480.00
		155.00	1.00	33775.00	NaN	33775.00	33775.00	33775.00	33775.00	33775.00
		159.00	4.00	18354.75	1876.13	15980.00	17494.25	18494.50	19355.00	20450.00
		161.00	1.00	31880.00	NaN	31880.00	31880.00	31880.00	31880.00	31880.00
		164.00	5.00	20322.00	6689.17	11700.00	15220.00	21700.00	25995.00	26995.00
		175.00	1.00	15780.00	NaN	15780.00	15780.00	15780.00	15780.00	15780.00
		177.00	1.00	37285.00	NaN	37285.00	37285.00	37285.00	37285.00	37285.00
		181.00	1.00	38950.00	NaN	38950.00	38950.00	38950.00	38950.00	38950.00
		183.00	1.00	40989.00	NaN	40989.00	40989.00	40989.00	40989.00	40989.00
		184.00	1.00	19790.00	NaN	19790.00	19790.00	19790.00	19790.00	19790.00
		186.00	6.00	36313.33	2032.34	34490.00	35176.25	35482.50	36913.75	39960.00
		187.00	5.00	36564.80	2480.89	33599.00	34815.00	36771.00	37690.00	39949.00
		194.00	1.00	17990.00	NaN	17990.00	17990.00	17990.00	17990.00	17990.00
		197.00	3.00	27596.33	13997.50	11600.00	22595.00	33590.00	35594.50	37599.00
Station wagon		0.00	1.00	16900.00	NaN	16900.00	16900.00	16900.00	16900.00	16900.00
		1.00	2.00	22245.00	11660.19	14000.00	18122.50	22245.00	26367.50	30490.00
		5.00	2.00	21800.00	4101.22	18900.00	20350.00	21800.00	23250.00	24700.00
		11.00	5.00	20765.60	5962.12	17480.00	17490.00	17950.00	19590.00	31318.00
		13.00	51.00	16284.86	4089.34	9900.00	12849.50	16000.00	19925.00	23900.00
		14.00	19.00	23303.68	5782.16	12750.00	20195.00	22890.00	27770.00	34580.00
		14.46	1.00	22990.00	NaN	22990.00	22990.00	22990.00	22990.00	22990.00
		15.00	7.00	26635.43	13590.70	13980.00	17750.00	18950.00	32949.00	52120.00
		16.00	2.00	33490.00	4949.75	29990.00	31740.00	33490.00	35240.00	36990.00
		17.00	20.00	31495.00	1538.97	29995.00	29995.00	31495.00	32995.00	32995.00
		99.00	3.00	13096.67	656.53	12500.00	12745.00	12990.00	13395.00	13800.00
		103.00	26.00	14527.58	1932.57	11700.00	12981.75	14085.00	16205.00	18350.00
		104.00	49.00	13776.59	2417.23	8913.00	12400.00	13990.00	15490.00	18388.00
		105.00	1.00	24080.00	NaN	24080.00	24080.00	24080.00	24080.00	24080.00
		109.00	63.00	13886.56	2203.59	9690.00	12249.50	13900.00	15909.00	19900.00
		110.00	1.00	35990.00	NaN	35990.00	35990.00	35990.00	35990.00	35990.00
		114.00	36.00	16604.31	2783.54	11500.00	14990.00	16990.00	17990.00	24990.00
		118.00	10.00	19440.50	6632.74	10490.00	16920.00	18140.00	19193.75	33890.00
		119.00	62.00	16609.31	4100.86	9500.00	13892.50	15485.00	19147.50	31700.00
		121.00	6.00	27610.00	2542.59	25435.00	25770.00	26767.50	28638.75	31990.00
		124.00	14.00	14593.43	1564.89	11680.00	13990.00	14970.00	15280.00	17900.00
		125.00	5.00	26439.80	4177.10	19900.00	25955.00	26379.00	29065.00	30900.00
		128.00	18.00	28723.61	4600.12	21490.00	25242.50	28757.50	32751.25	37490.00
		129.00	10.00	16322.50	2879.55	12500.00	13855.00	16717.50	17480.00	21000.00

			count	mean	std	min	25%	50%	75%	max
make_model	body_type	CO2_Emission								
Renault Clio	Compact	130.00	34.00	17034.68	3470.85	11675.00	12911.25	18775.00	19762.50	21450.00
		131.00	18.00	14031.11	1010.07	12450.00	13210.00	13945.00	14940.00	15440.00
		133.00	27.00	20611.63	3946.78	14480.00	19825.00	20550.00	21070.00	34990.00
		134.00	21.00	14106.57	3288.38	9000.00	11840.00	13690.00	15600.00	20900.00
		135.00	28.00	12775.32	2065.99	8990.00	11467.50	12445.00	14512.50	17450.00
		136.00	39.00	20960.46	3820.69	14840.00	18500.00	19999.00	22758.00	31500.00
		137.00	53.00	22318.94	2369.06	18950.00	20989.00	21900.00	22900.00	33500.00
		138.00	9.00	18931.11	6117.28	10900.00	12990.00	21450.00	23490.00	26990.00
		139.00	392.00	21076.54	7308.16	8290.00	15300.00	20750.00	24043.25	40745.00
		140.00	17.00	29501.47	3907.06	19750.00	28490.00	29675.00	29950.00	35490.00
		141.00	113.00	23357.19	3560.75	17489.00	21690.00	22890.00	23950.00	40990.00
		143.00	3.00	29626.33	10741.35	17900.00	24945.00	31990.00	35489.50	38989.00
		144.00	5.00	22337.80	7993.97	15500.00	17999.00	20440.00	21770.00	35980.00
		145.00	94.00	23438.61	8250.15	9980.00	17112.50	20935.00	29311.25	42995.00
		146.00	15.00	15121.53	3058.08	10500.00	12635.00	14980.00	17723.50	19299.00
		147.00	67.00	30584.79	7967.16	11490.00	24500.00	32990.00	36845.00	44970.00
		148.00	35.00	24858.37	7072.27	15450.00	20130.00	23880.00	28270.00	38240.00
		149.00	43.00	17419.49	6211.19	12390.00	14480.00	15300.00	17220.00	39990.00
		150.00	112.00	23954.95	5161.55	15990.00	20537.50	22960.00	24055.00	40990.00
		151.00	18.00	33449.83	7650.87	14480.00	29483.75	36540.50	38365.00	41450.00
		154.00	17.00	36960.59	2597.08	32970.00	34890.00	37950.00	38900.00	40990.00
		155.00	2.00	13625.00	1025.30	12900.00	13262.50	13625.00	13987.50	14350.00
		156.00	11.00	35829.45	3463.78	30155.00	34450.00	35450.00	37185.00	42475.00
		157.00	3.00	36932.33	6502.38	32500.00	33200.00	33900.00	39148.50	44397.00
		161.00	2.00	14700.00	282.84	14500.00	14600.00	14700.00	14800.00	14900.00
		164.00	7.00	17207.14	1594.54	13990.00	16875.00	17750.00	17985.00	18990.00
		166.00	8.00	23327.38	8034.94	16501.00	17961.75	20615.00	24386.75	37490.00
		169.00	14.00	16601.57	2741.81	12695.00	14599.25	16199.50	19346.75	19990.00
		170.00	5.00	17254.00	1515.73	15500.00	16490.00	16900.00	17890.00	19490.00
		171.00	1.00	32995.00	NaN	32995.00	32995.00	32995.00	32995.00	32995.00
		175.00	1.00	16990.00	NaN	16990.00	16990.00	16990.00	16990.00	16990.00
		180.00	1.00	37235.00	NaN	37235.00	37235.00	37235.00	37235.00	37235.00
		187.00	21.00	37357.62	1678.54	33450.00	36450.00	37450.00	37950.00	40450.00
		188.00	3.00	37855.67	2205.66	35585.00	36788.50	37992.00	38991.00	39990.00
		189.00	3.00	15458.00	3192.20	11875.00	14187.50	16500.00	17249.50	17999.00
		190.00	1.00	17790.00	NaN	17790.00	17790.00	17790.00	17790.00	17790.00
		197.00	1.00	35380.00	NaN	35380.00	35380.00	35380.00	35380.00	35380.00
		199.00	2.00	29365.00	9637.87	22550.00	25957.50	29365.00	32772.50	36180.00
		239.00	1.00	12000.00	NaN	12000.00	12000.00	12000.00	12000.00	12000.00
		253.00	1.00	17990.00	NaN	17990.00	17990.00	17990.00	17990.00	17990.00
	Van	137.00	1.00	20980.00	NaN	20980.00	20980.00	20980.00	20980.00	20980.00
Renault Clio	Compact	8.00	1.00	9680.00	NaN	9680.00	9680.00	9680.00	9680.00	9680.00
		9.00	5.00	16092.00	6041.39	7650.00	11950.00	18970.00	19900.00	21990.00

			count	mean	std	min	25%	50%	75%	max
make_model	body_type	CO2_Emission								
		85.00	47.00	8006.47	1032.86	5890.00	7700.00	7950.00	8275.00	12990.00
		90.00	7.00	9999.00	0.00	9999.00	9999.00	9999.00	9999.00	9999.00
		99.00	1.00	8350.00	NaN	8350.00	8350.00	8350.00	8350.00	8350.00
		104.00	1.00	10490.00	NaN	10490.00	10490.00	10490.00	10490.00	10490.00
		105.00	8.00	15329.38	4384.07	10400.00	10842.50	15492.50	19512.50	20730.00
		111.00	1.00	8450.00	NaN	8450.00	8450.00	8450.00	8450.00	8450.00
		113.00	94.00	10953.23	485.79	9890.00	10620.00	11180.00	11299.00	11490.00
		114.00	10.00	10557.00	1050.55	7750.00	10440.00	10940.00	10997.50	11490.00
		116.00	1.00	10880.00	NaN	10880.00	10880.00	10880.00	10880.00	10880.00
		118.00	11.00	11379.09	784.32	10946.00	10984.00	11222.00	11341.00	13670.00
		119.00	3.00	11243.33	80.83	11150.00	11220.00	11290.00	11290.00	11290.00
		120.00	198.00	13764.23	3607.30	5800.00	10990.00	14912.00	15928.00	29740.00
		123.00	1.00	11400.00	NaN	11400.00	11400.00	11400.00	11400.00	11400.00
		125.00	1.00	15590.00	NaN	15590.00	15590.00	15590.00	15590.00	15590.00
		126.00	33.00	13808.64	1018.90	13390.00	13390.00	13390.00	13390.00	16880.00
		127.00	22.00	9976.82	817.91	8490.00	9582.50	9989.00	10595.50	11299.00
		130.00	2.00	9490.00	0.00	9490.00	9490.00	9490.00	9490.00	9490.00
		133.00	14.00	11140.64	3761.85	6800.00	9817.50	10185.00	10920.00	20950.00
		135.00	12.00	25588.00	2252.86	22950.00	23972.50	24535.00	27807.75	28949.00
		136.00	1.00	14950.00	NaN	14950.00	14950.00	14950.00	14950.00	14950.00
		140.00	10.00	20666.90	3965.02	13990.00	18192.25	21090.00	22572.50	26890.00
	Coupe	140.00	1.00	17990.00	NaN	17990.00	17990.00	17990.00	17990.00	17990.00
	Off-Road	125.00	2.00	12845.00	7276.13	7700.00	10272.50	12845.00	15417.50	17990.00
	Sedans	8.00	11.00	8739.09	1400.00	6790.00	7545.00	8500.00	9895.00	10700.00
		9.00	63.00	12985.06	2210.17	8900.00	10990.00	13280.00	14799.50	17800.00
		85.00	147.00	8572.72	1042.20	5850.00	7900.00	8400.00	9600.00	10790.00
		90.00	3.00	9866.67	1721.43	8500.00	8900.00	9300.00	10550.00	11800.00
		94.00	1.00	9990.00	NaN	9990.00	9990.00	9990.00	9990.00	9990.00
		95.00	17.00	8119.53	1416.12	5445.00	7500.00	7999.00	8600.00	10300.00
		98.00	8.00	8656.25	1522.32	6950.00	6950.00	9000.00	9925.00	10500.00
		104.00	18.00	9453.72	1006.48	7500.00	8550.00	9550.00	10417.50	10699.00
		105.00	21.00	10223.71	1996.14	6250.00	9250.00	10190.00	10500.00	14280.00
		106.00	1.00	19580.00	NaN	19580.00	19580.00	19580.00	19580.00	19580.00
		108.00	9.00	10133.22	2152.85	6400.00	9900.00	10700.00	10999.00	13500.00
		109.00	12.00	16632.25	2101.70	13600.00	15200.00	17050.00	18325.00	19300.00
		113.00	88.00	10831.61	482.80	9600.00	10786.00	10985.00	11024.25	11490.00
		114.00	200.00	10305.30	2651.15	6000.00	8380.00	9980.00	11010.00	22800.00
		116.00	2.00	9999.00	0.00	9999.00	9999.00	9999.00	9999.00	9999.00
		118.00	30.00	10386.63	534.18	9999.00	9999.00	9999.00	10900.00	11490.00
		119.00	2.00	10890.00	565.69	10490.00	10690.00	10890.00	11090.00	11290.00
		120.00	74.00	15050.51	2109.98	9875.00	13825.00	14990.00	16362.75	19490.00
		121.00	1.00	9999.00	NaN	9999.00	9999.00	9999.00	9999.00	9999.00
		123.00	2.00	11175.00	318.20	10950.00	11062.50	11175.00	11287.50	11400.00

			count	mean	std	min	25%	50%	75%	max
make_model	body_type	CO2_Emission								
Renault Duster	Station wagon	125.00	2.00	16172.50	456.08	15850.00	16011.25	16172.50	16333.75	16495.00
		126.00	22.00	16050.27	717.29	15480.00	15790.00	15882.50	15996.00	18990.00
		127.00	108.00	9291.97	995.44	6500.00	8597.50	9494.50	9990.00	11290.00
		128.00	1.00	14990.00	NaN	14990.00	14990.00	14990.00	14990.00	14990.00
		130.00	5.00	9793.60	277.17	9490.00	9490.00	9990.00	9999.00	9999.00
		131.00	1.00	10900.00	NaN	10900.00	10900.00	10900.00	10900.00	10900.00
		133.00	23.00	11708.96	4606.39	6900.00	9245.00	9880.00	10594.50	22300.00
		135.00	82.00	22567.65	3747.34	10798.00	21900.00	23021.00	23867.50	31500.00
		140.00	30.00	18766.60	1931.97	16998.00	18490.00	18490.00	18490.00	28880.00
		8.00	5.00	8149.00	598.65	7500.00	7795.00	7950.00	8500.00	9000.00
		9.00	38.00	11948.63	2158.64	7200.00	11500.00	11500.00	12592.50	18980.00
		85.00	73.00	9555.03	1282.83	5900.00	8600.00	10000.00	10450.00	12000.00
		87.00	2.00	14580.00	8626.70	8480.00	11530.00	14580.00	17630.00	20680.00
		95.00	5.00	8317.80	1525.13	7200.00	7490.00	7500.00	8499.00	10900.00
		104.00	1.00	15798.00	NaN	15798.00	15798.00	15798.00	15798.00	15798.00
		105.00	1.00	7500.00	NaN	7500.00	7500.00	7500.00	7500.00	7500.00
		106.00	1.00	9150.00	NaN	9150.00	9150.00	9150.00	9150.00	9150.00
		108.00	1.00	10700.00	NaN	10700.00	10700.00	10700.00	10700.00	10700.00
		109.00	3.00	18700.00	1299.04	17200.00	18325.00	19450.00	19450.00	19450.00
		113.00	12.00	10544.25	1023.74	8490.00	10215.50	10927.00	11264.25	11470.00
		114.00	1.00	11350.00	NaN	11350.00	11350.00	11350.00	11350.00	11350.00
		118.00	55.00	11775.04	3200.01	7250.00	9999.00	11150.00	14735.00	19490.00
		120.00	46.00	15708.57	2042.23	11600.00	14870.00	14990.00	16987.50	20800.00
		123.00	2.00	13622.50	526.79	13250.00	13436.25	13622.50	13808.75	13995.00
		126.00	28.00	8786.43	1568.55	8490.00	8490.00	8490.00	8490.00	16790.00
		127.00	32.00	9537.84	801.20	6900.00	9387.50	9800.00	9990.00	10507.00
		128.00	1.00	13445.00	NaN	13445.00	13445.00	13445.00	13445.00	13445.00
		130.00	20.00	9545.95	500.44	8450.00	9190.00	9595.00	9825.00	10790.00
		133.00	1.00	8690.00	NaN	8690.00	8690.00	8690.00	8690.00	8690.00
		134.00	1.00	7999.00	NaN	7999.00	7999.00	7999.00	7999.00	7999.00
		135.00	7.00	9403.43	302.19	8980.00	9339.00	9389.00	9389.00	9999.00
		140.00	1.00	13990.00	NaN	13990.00	13990.00	13990.00	13990.00	13990.00
	Renault Espace	Transporter	85.00	5.00	7498.00	583.11	6490.00	7500.00	7800.00	7800.00
			90.00	19.00	8571.37	1376.54	5900.00	7890.00	8590.00	9340.00
			95.00	1.00	7000.00	NaN	7000.00	7000.00	7000.00	7000.00
			118.00	2.00	9262.00	0.00	9262.00	9262.00	9262.00	9262.00
			128.00	2.00	10172.50	406.59	9885.00	10028.75	10172.50	10316.25
	Renault Espace	Van	114.00	2.00	9650.00	353.55	9400.00	9525.00	9650.00	9775.00
			1.00	1.00	10850.00	NaN	10850.00	10850.00	10850.00	10850.00
			150.00	8.00	14641.50	1487.58	13250.00	13250.00	14641.50	16033.00
	Renault Espace	Compact	186.00	25.00	12873.76	1393.39	10900.00	11900.00	12250.00	14399.00
			120.00	1.00	21900.00	NaN	21900.00	21900.00	21900.00	21900.00
			140.00	4.00	29597.50	11002.00	17900.00	22467.50	28745.00	35875.00

make_model	body_type	CO2_Emission	count	mean	std	min	25%	50%	75%	max
			153.00	1.00	39990.00	NaN	39990.00	39990.00	39990.00	39990.00
Coupe	Coupe	123.00	2.00	30567.00	5052.99	26994.00	28780.50	30567.00	32353.50	34140.00
	Off-Road	120.00	7.00	25885.71	5804.65	14900.00	24100.00	27850.00	28675.00	32900.00
		123.00	1.00	24900.00	NaN	24900.00	24900.00	24900.00	24900.00	24900.00
Sedans	17.00	1.00	46895.00	NaN	46895.00	46895.00	46895.00	46895.00	46895.00	46895.00
	116.00	1.00	23990.00	NaN	23990.00	23990.00	23990.00	23990.00	23990.00	23990.00
	123.00	16.00	27574.06	4190.92	18999.00	25490.00	26498.00	30206.25	36900.00	
	139.00	2.00	44770.50	5271.48	41043.00	42906.75	44770.50	46634.25	48498.00	
	153.00	1.00	29490.00	NaN	29490.00	29490.00	29490.00	29490.00	29490.00	29490.00
	Station wagon	116.00	4.00	18835.00	1770.00	17950.00	17950.00	17950.00	18835.00	21490.00
		120.00	32.00	21812.34	4842.01	17950.00	19950.00	20455.00	21950.00	39990.00
		123.00	22.00	26835.41	5846.51	16900.00	23115.00	26795.00	29996.75	37990.00
		135.00	1.00	41390.00	NaN	41390.00	41390.00	41390.00	41390.00	41390.00
		139.00	4.00	46115.00	4750.00	42490.00	43240.00	44490.00	47365.00	52990.00
		140.00	11.00	24460.00	4104.94	19000.00	21950.00	23400.00	26740.00	33900.00
Transporter	153.00	11.00	33889.09	5159.22	28990.00	29945.00	32900.00	35375.00	43790.00	
	168.00	6.00	42371.67	4900.49	36950.00	39340.00	42525.00	42882.50	50950.00	
	116.00	7.00	19906.86	4153.23	14999.00	17425.00	20500.00	20500.00	27999.00	
	120.00	41.00	22749.73	4022.05	17000.00	19900.00	21000.00	26000.00	31000.00	
	135.00	1.00	32700.00	NaN	32700.00	32700.00	32700.00	32700.00	32700.00	
	140.00	3.00	23583.33	1414.51	21950.00	23175.00	24400.00	24400.00	24400.00	
Van	1.00	1.00	32000.00	NaN	32000.00	32000.00	32000.00	32000.00	32000.00	
	14.00	2.00	41590.00	6081.12	37290.00	39440.00	41590.00	43740.00	45890.00	
	15.00	14.00	47136.07	9996.70	26800.00	40040.00	49695.00	55088.75	58950.00	
	17.00	2.00	44040.00	6731.66	39280.00	41660.00	44040.00	46420.00	48800.00	
	116.00	37.00	21330.22	4764.57	12614.00	17900.00	20900.00	24900.00	31800.00	
	117.00	1.00	19990.00	NaN	19990.00	19990.00	19990.00	19990.00	19990.00	
	119.00	3.00	22325.00	5033.55	16990.00	19992.50	22995.00	24992.50	26990.00	
	120.00	199.00	26761.31	6164.83	13500.00	22990.00	26000.00	30079.50	68320.00	
	123.00	264.00	30547.09	8544.48	12990.00	24475.00	29825.00	34558.75	64332.00	
	125.00	23.00	28689.00	7787.75	17999.00	23690.00	26900.00	32395.00	46890.00	
	135.00	23.00	32894.78	6911.90	12990.00	28890.00	31850.00	35482.50	46760.00	
	139.00	29.00	40478.62	5788.75	31975.00	35975.00	39700.00	45990.00	54205.00	
	140.00	18.00	27206.28	6456.18	18480.00	23050.00	26470.00	30285.00	45990.00	
	147.00	13.00	28869.62	4236.26	20990.00	26500.00	28900.00	32570.00	34170.00	
	148.00	10.00	44191.10	4054.70	39070.00	40488.75	43985.00	46909.00	50170.00	
	151.00	2.00	48150.00	806.10	47580.00	47865.00	48150.00	48435.00	48720.00	
	153.00	96.00	32611.47	6303.15	25490.00	25490.00	31825.00	35991.25	48990.00	
	161.00	7.00	33920.00	3502.03	29611.00	31285.00	32990.00	36789.50	38690.00	
	168.00	51.00	37566.88	5985.24	28975.00	33070.00	36781.00	39937.50	54120.00	
	174.00	5.00	51151.00	5759.22	43490.00	47600.00	51750.00	54925.00	57990.00	
	175.00	6.00	36931.67	2811.67	33781.00	35630.00	35830.00	38286.75	41480.00	
	188.00	1.00	43080.00	NaN	43080.00	43080.00	43080.00	43080.00	43080.00	

			count	mean	std	min	25%	50%	75%	max
make_model	body_type	CO2_Emission								
		191.00	2.00	28465.00	0.00	28465.00	28465.00	28465.00	28465.00	28465.00
		193.00	1.00	38990.00	NaN	38990.00	38990.00	38990.00	38990.00	38990.00

```
In [59]: cond = ((df.CO2_Emission < 52) | (df.CO2_Emission > 330))
df.loc[cond, "CO2_Emission"] = np.nan
```

```
In [60]: df.CO2_Emission.isnull().sum()
```

```
Out[60]: 1188
```

```
In [61]: fill(df, "make_model", "body_type", "CO2_Emission", "median")
```

Number of NaN : 0

120.00	842
99.00	828
106.00	756
104.00	681
139.00	633
114.00	630
117.00	598
124.00	559
97.00	539
103.00	453
129.00	434
123.00	430
105.00	379
98.00	366
107.00	362
108.00	362
119.00	361
118.00	357
133.00	348
128.00	329
110.00	297
126.00	284
85.00	275
127.00	257
111.00	237
113.00	235
109.00	234
140.00	221
118.50	221
135.00	202
130.00	189
150.00	174
143.00	171
95.00	161
116.00	157
141.00	156
136.00	145
137.00	135
125.00	133
134.00	130
145.00	126
149.00	117
153.00	113
147.00	109
101.00	105
115.00	86
121.00	82
138.00	75
93.00	66
168.00	58
90.00	54
131.00	48
148.00	48
144.00	40
154.00	40
94.00	37
146.00	36
100.00	36

```
151.00    34
186.00    32
91.00     31
187.00    26
96.00     22
89.00     19
189.00    19
157.00    18
164.00    17
158.00    17
88.00     15
169.00    15
156.00    14
161.00    10
170.00    10
175.00     8
155.00     8
166.00     8
188.00     7
159.00     7
87.00      6
174.00     6
116.50     4
197.00     4
194.00     3
191.00     2
84.00      2
199.00     2
167.00     2
183.00     1
180.00     1
181.00     1
190.00     1
160.00     1
80.00      1
165.00     1
253.00     1
112.50     1
177.00     1
193.00     1
171.00     1
184.00     1
239.00     1
Name: CO2_Emission, dtype: int64
```

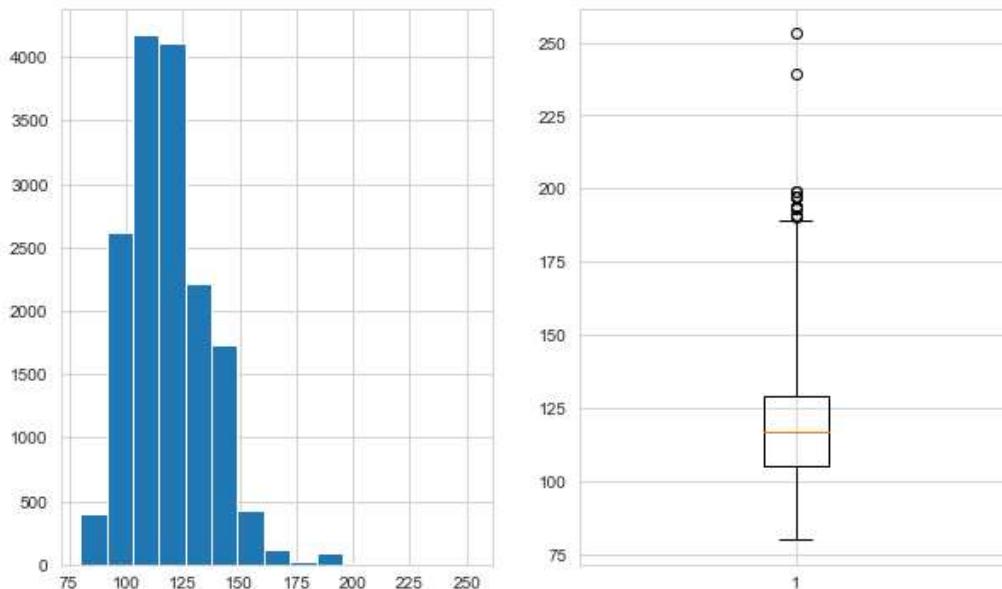
In [62]:

```
plt.figure(figsize=(10,6))

plt.subplot(121)
plt.hist(df.CO2_Emission, bins=15)

plt.subplot(122)
plt.boxplot(df.CO2_Emission, whis=2.5)

plt.show()
```



In [63]:

```
plt.figure(figsize=(10,6))
```

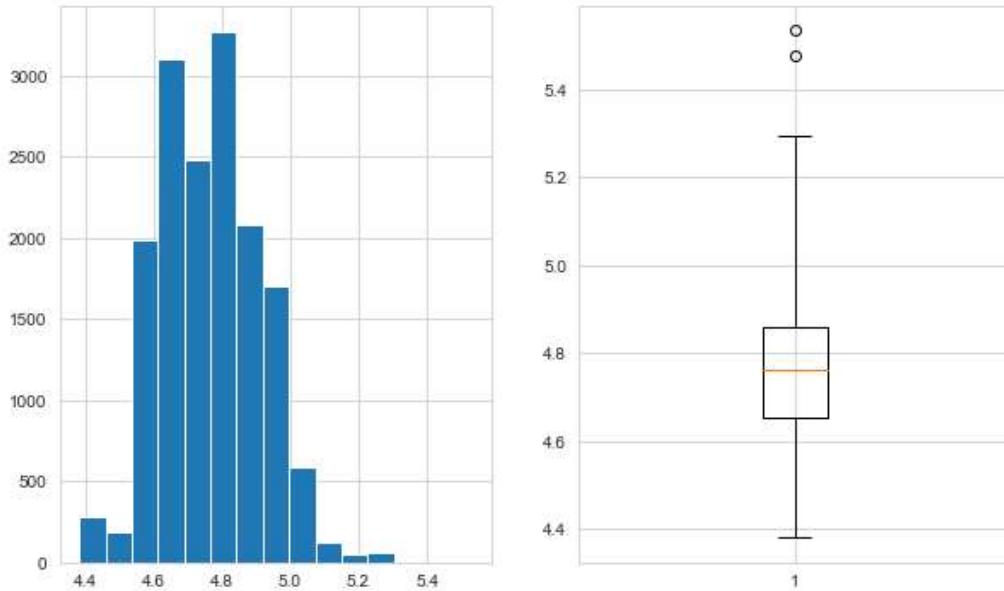
```

plt.subplot(121)
plt.hist(np.log(df.CO2_Emission), bins=15)

plt.subplot(122)
plt.boxplot(np.log(df.CO2_Emission), whiskerprops={ 'whiskerStyle': 'solid' }, boxprops={ 'outline': True }, medianprops={ 'color': 'orange' }, showfliers=True)

plt.show()

```



price

TARGET SÜTUNUNDAKİ OUTLIER'LARI DOLDURMAK, MANUPİLE ETMEKTEN ZİYADE SİLMEK GEREKİR.

In [64]: `df.price.describe()`

Out[64]:

	count	mean	std	min	25%	50%	75%	max
Name: price, dtype: float64	15919.00	18019.90	7386.17	13.00	12850.00	16900.00	21900.00	74600.00

In [67]: `df.price.sort_values().head(5)`

Out[67]:

	price
8827	4950
8825	4990
8826	5250
8824	5300
13770	5445

Name: price, dtype: int64

In []: `df.drop(index = [8594, 8828, 6066, 8829], axis = 0, inplace = True)`

In [69]: `df.reset_index(drop = True, inplace = True)`

In [70]: `df.shape`

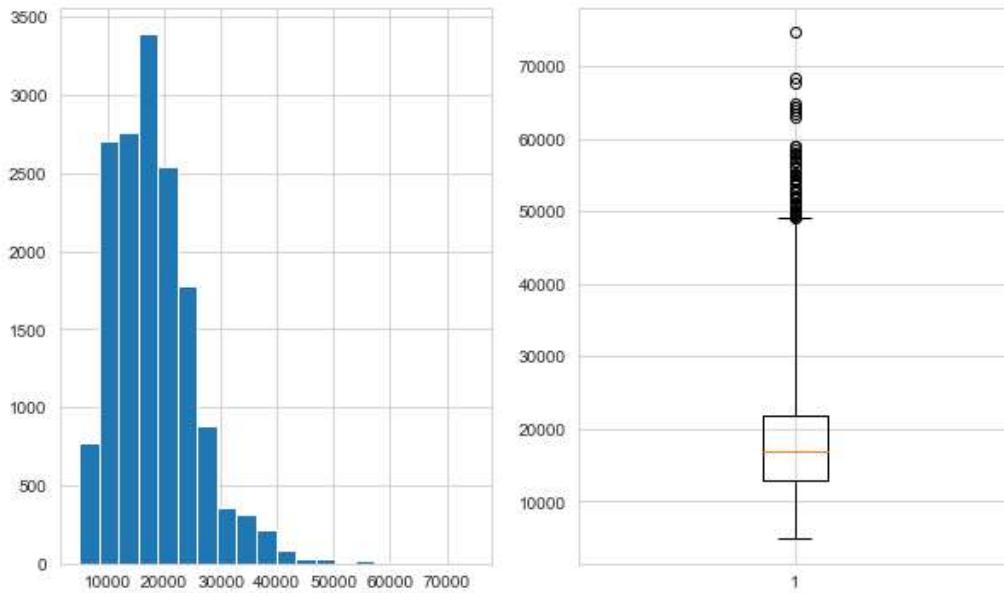
Out[70]: (15915, 27)

OUTLIER'LAR NORMALSE WHISKERS DEFAULT 1,5 YERİNE ARTTIRILARAK 2,5 - 3 YAPILABİLİR.

In [71]: `plt.figure(figsize=(10,6))
plt.subplot(121)
plt.hist(df.price, bins=20)`

```
plt.subplot(122)
plt.boxplot(df.price, whis=3)

plt.show()
```



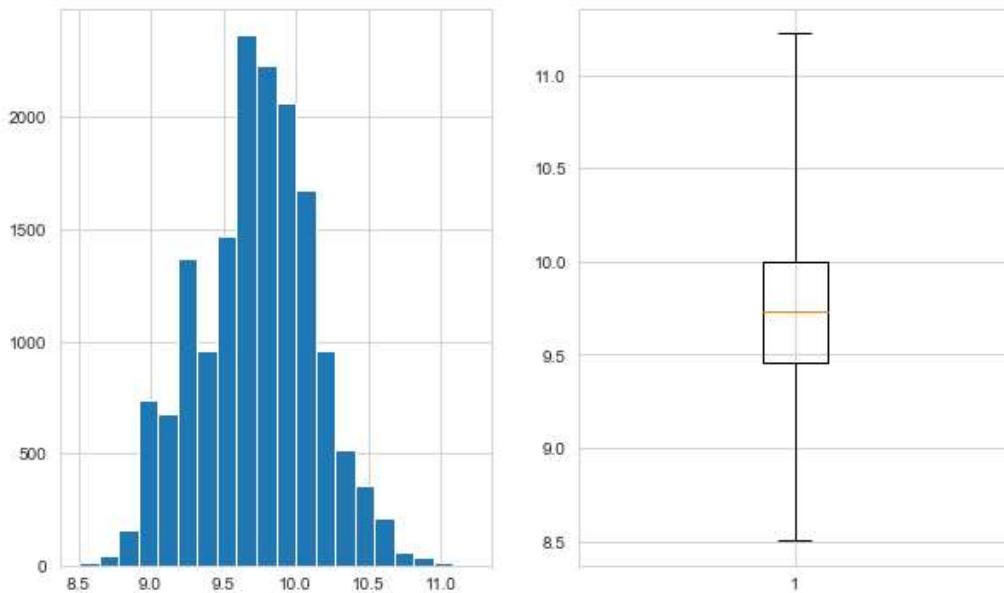
OUTLIER'LAR İLE MÜCADELE YÖNTEMLERİNDEN BİRİ DE LOG ALMADIR. OUTLIER'LARIN BÜYÜK KISMINI İÇERİ ÇEKER. WINSORIZE (0.003) OUTLIER'LARI BİNDE 3 İÇERİ ÇEKER.

In [72]:

```
plt.figure(figsize=(10,6))
plt.subplot(121)
plt.hist(np.log(df.price), bins=20)

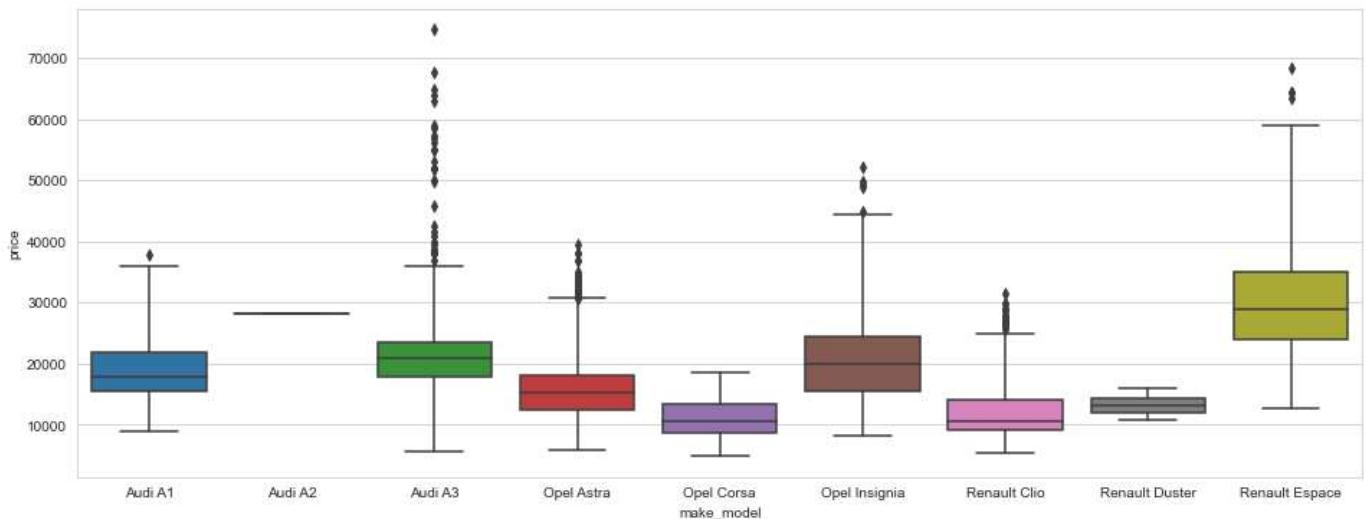
plt.subplot(122)
plt.boxplot(np.log(df.price), whis=2.3)

plt.show()
```

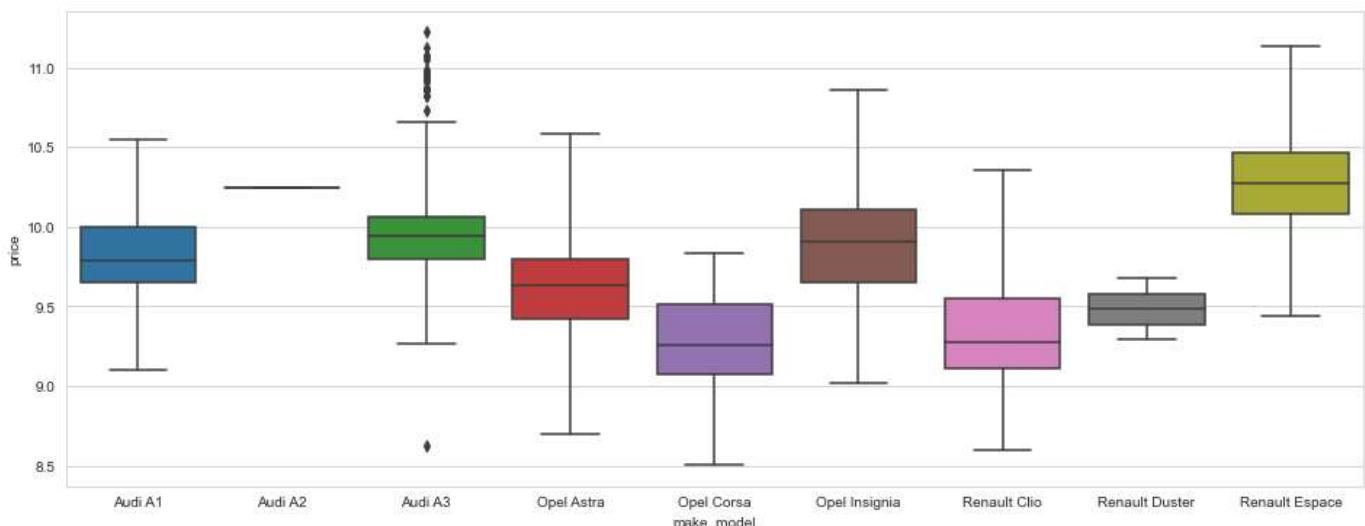


In [73]:

```
plt.figure(figsize=(16,6))
sns.boxplot(x="make_model", y="price", data=df, whis=2.3)
plt.show()
```



```
In [74]: plt.figure(figsize=(16,6))
sns.boxplot(x="make_model", y=np.log(df.price), data=df, whis=2.3)
plt.show()
```



make_model

SADECE 1 TANE OLAN AUDI A2, 5 TANE OLAN ELEKTRİKLİ ARAÇLAR GİBİ DATADA AZ SAYIDA VERİSİ OLAN ÇEŞİTLERİ, SATIRLARI DATADAN BAŞTA DÜŞMEK UYGUN OLUR

```
In [75]: df[df.make_model=="Audi A2"]
```

```
Out[75]:    make_model  body_type  price      vat   km registration      Type   Fuel  Emission Label  Gears  Comfort_Convenien
              2614       Audi A2  Off-Road  28200  VAT deductible  NaN  2018-10-01 Employee's car Diesel     4.00    6.00 conditioning,Armrest,Automa
                                         climate co
```

```
In [76]: df.drop(index = [2614], inplace = True)
```

SATIR SİLDİKTEN SONRA RESET_INDEX KULLANIMINDA DROP=True

```
In [77]: df.reset_index(drop = True, inplace = True)
```

```
In [78]: df.shape
```

```
Out[78]: (15914, 27)
```

Final_Step

```
In [79]:
```

```
df.head(3).T
```

```
Out[79]:
```

	0	1	2
make_model	Audi A1	Audi A1	Audi A1
body_type	Sedans	Sedans	Sedans
price	15770	14500	14640
vat	VAT deductible	Price negotiable	VAT deductible
km	NaN	NaN	NaN
registration	2016-01-01	2017-03-01	2016-02-01
Type	Used	Used	Used
Fuel	Diesel	Benzine	Diesel
Emission_Label	NaN	4.00	4.00
Gears	7.00	7.00	7.00
Comfort_Convenience	Air conditioning,Armrest,Automatic climate con...	Air conditioning,Automatic climate control,Hil...	Air conditioning,Cruise control,Electrical sid...
Entertainment_Media	Bluetooth,Hands-free equipment,On-board comput...	Bluetooth,Hands-free equipment,On-board comput...	MP3,On-board computer
Extras	Alloy wheels,Catalytic Converter,Voice Control	Alloy wheels,Sport seats,Sport suspension,Voic...	Alloy wheels,Voice Control
Safety_Security	ABS,Central door lock,Daytime running lights,D...	ABS,Central door lock,Central door lock with r...	ABS,Central door lock,Daytime running lights,D...
age	3.00	2.00	3.00
Previous_Owners	2.00	1.00	1.00
hp_kw	66.00	141.00	85.00
Type1	Used	Used	Used
Inspection_new	1	0	0
Paint_Type	Metallic	Metallic	Metallic
Upholstery_type	Cloth	Cloth	Cloth
Gearing_Type	Automatic	Automatic	Automatic
Displacement_cc	1422.00	1798.00	1598.00
Weight_kg	1220.00	1255.00	1135.00
Drive_chain	front	front	front
cons_comb	3.80	5.60	3.80
CO2_Emission	99.00	129.00	99.00

```
In [80]:
```

```
numeric_col = "price,km,Gears,Previous_Owners,cons_comb,Displacement_cc,age,hp_kw,Weight_kg,CO2_Emission".split()
```

```
In [81]:
```

```
df_num = df[numeric_col]
```

```
In [82]:
```

```
df_num
```

```
Out[82]:
```

	price	km	Gears	Previous_Owners	cons_comb	Displacement_cc	age	hp_kw	Weight_kg	CO2_Emission
0	15770	NaN	7.00	2.00	3.80	1422.00	3.00	66.00	1220.00	99.00
1	14500	NaN	7.00	1.00	5.60	1798.00	2.00	141.00	1255.00	129.00
2	14640	NaN	7.00	1.00	3.80	1598.00	3.00	85.00	1135.00	99.00

	price	km	Gears	Previous_Owners	cons_comb	Displacement_cc	age	hp_kW	Weight_kg	CO2_Emission	
3	14500	NaN	6.00		1.00	3.80	1422.00	3.00	66.00	1195.00	99.00
4	16790	NaN	7.00		1.00	4.10	1422.00	3.00	66.00	1135.00	109.00
...
15909	39950	NaN	6.00		1.00	5.30	1997.00	0.00	147.00	1758.00	139.00
15910	39885	NaN	7.00		1.00	7.40	1798.00	0.00	165.00	1708.00	168.00
15911	39875	NaN	6.00		1.00	5.30	1997.00	0.00	146.00	1734.00	139.00
15912	39700	NaN	6.00		1.00	5.30	1997.00	0.00	147.00	1758.00	139.00
15913	40999	NaN	6.00		1.00	6.80	1798.00	0.00	165.00	1685.00	153.00

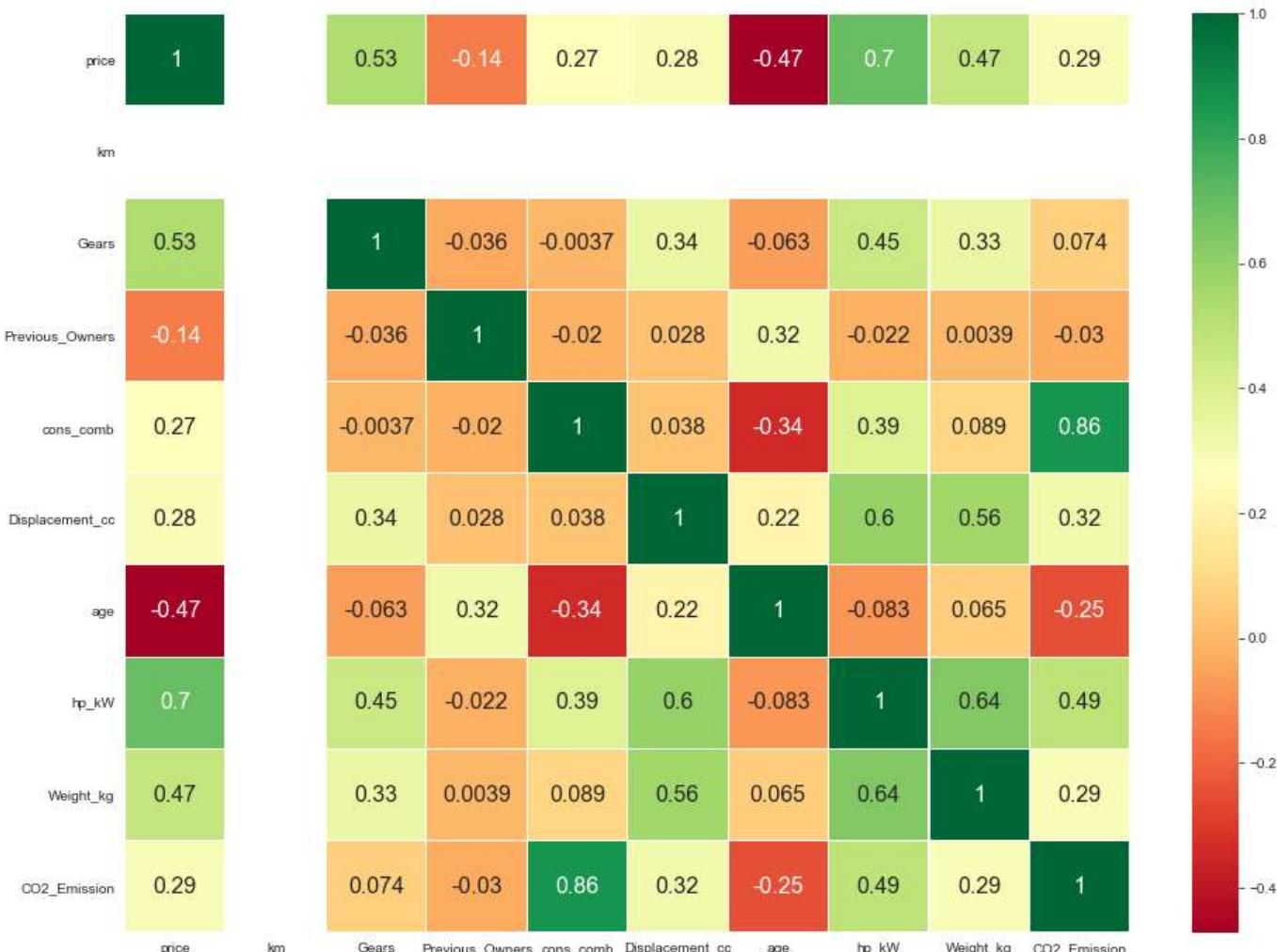
15914 rows × 10 columns

TARGET SÜTUNU HARİCİNDEKİ SÜTUNLARDAN BİR BİRİYLE YÜKSEK KORELE OLANLARDAN SADECE BİRİNİ MODELE SOKMAK GEREKİR. MESALA CO2 EMİSYONU İLE TÜKETİM SÜTUNLARI BİR BİRİYLE YÜKSEK DÜZEYDE KORELE.

In [83]:

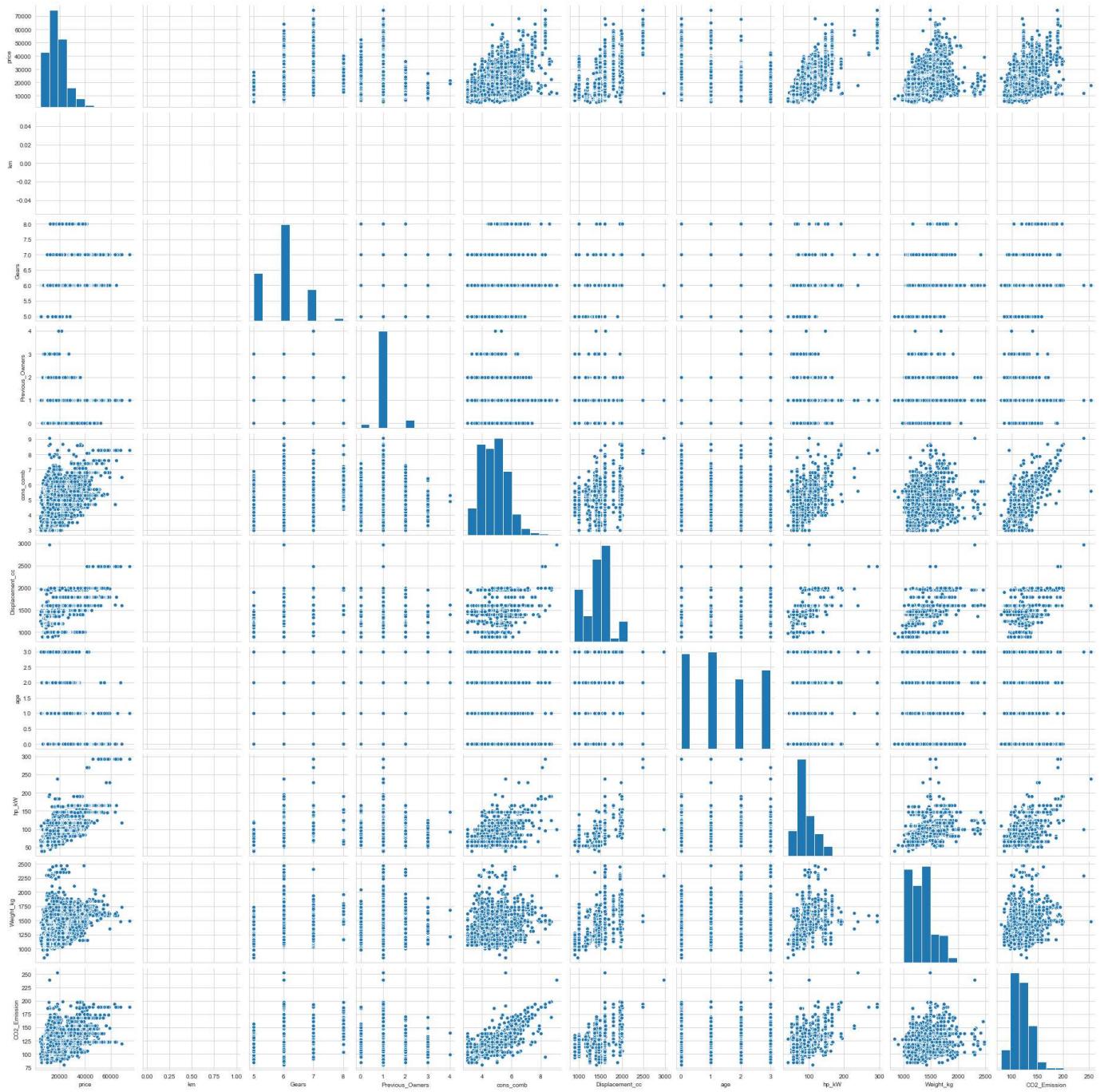
```
plt.figure(figsize = (16,12))
sns.heatmap(df_num.corr(), annot = True, cmap="RdYlGn", linewidths=0.2, annot_kws = {"size": 16})
```

Out[83]: <AxesSubplot:>



In [84]:

```
sns.pairplot(df_num, size = 2.5)
plt.show()
```



Dummy Operation

In [85]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 15914 entries, 0 to 15913
Data columns (total 27 columns):
 #   Column           Non-Null Count  Dtype  
 --- 
 0   make_model      15914 non-null   object  
 1   body_type       15914 non-null   object  
 2   price          15914 non-null   int64  
 3   vat            15914 non-null   object  
 4   km             0 non-null      float64 
 5   registration    14317 non-null   object  
 6   Type           15914 non-null   object  
 7   Fuel           15914 non-null   object  
 8   Emission_Label 3944 non-null   float64 
 9   Gears          15914 non-null   float64 
 10  Comfort_Convenience 15914 non-null   object  
 11  Entertainment_Media 15914 non-null   object  
 12  Extras          15914 non-null   object  
 13  Safety_Security 15914 non-null   object  
 14  age            15914 non-null   float64 
 15  Previous_Owners 15914 non-null   float64 
 16  hp_kw          15914 non-null   float64 
 17  Type1          15912 non-null   object  
 18  Inspection_new 15914 non-null   int64
```

```
19 Paint_Type           15914 non-null  object
20 Upholstery_type     15914 non-null  object
21 Gearing_Type        15914 non-null  object
22 Displacement_cc     15914 non-null  float64
23 Weight_kg           15914 non-null  float64
24 Drive_chain          15914 non-null  object
25 cons_comb            15914 non-null  float64
26 CO2_Emission         15914 non-null  float64
dtypes: float64(10), int64(2), object(15)
memory usage: 3.3+ MB
```

```
In [86]: df.shape
```

```
Out[86]: (15914, 27)
```

```
In [87]: df.to_csv("final_scout_not_dummy.csv", index=False)
```