back2grid

by ROSETTA

Share your battery for win-win!

back2grid is a system that stabilizes power of the electrical grid by enabling parked electric cars to sell their battery energy back to the grid when energy demand is high and help customers earn money from the system.

Problem 1

- **Power grids** have the necessity of fulfilling the high energy requirements in peak time periods (from 10am to 22pm). In those cases, they mostly rely on the energy with the high carbon footprint.

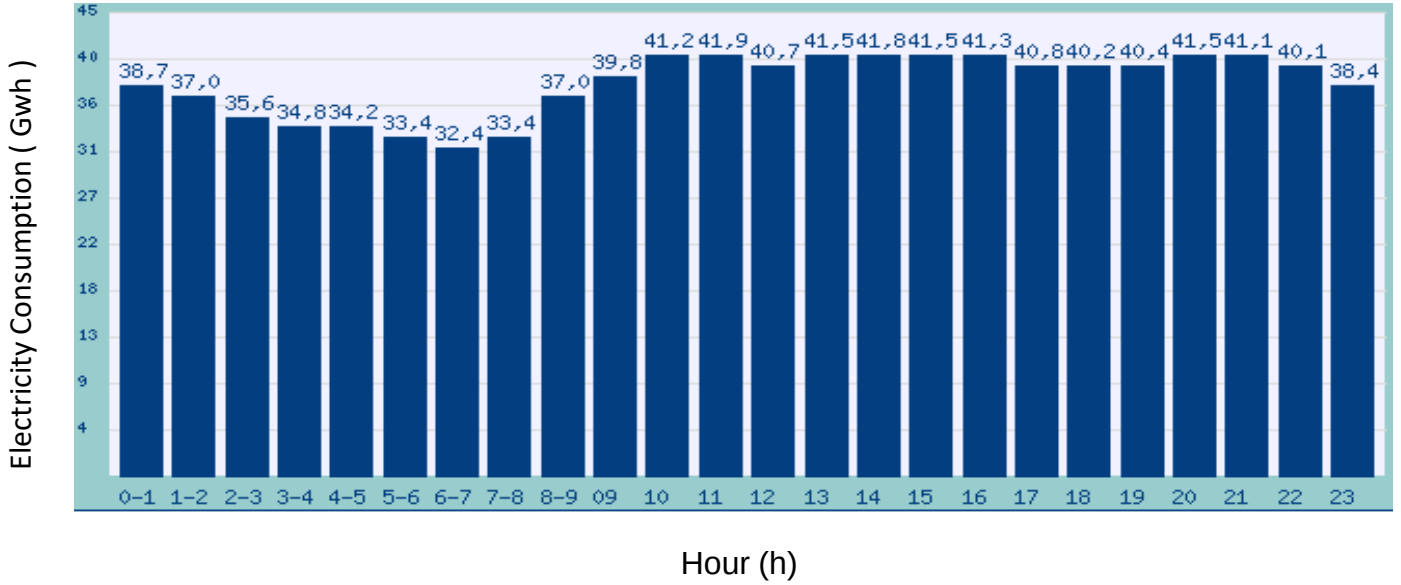


Figure: Hourly Electric Consumption (GWh) *

**TEİAŞ*

Problem 2

- In the near future, the number of electric vehicles in Turkey’s traffic are expected to increase 140.000 from 2.500 *
- Thus, energy demand will increase.

** Boğaziçi University Energy Policy Research Center (EPAM)*

Problem 3

- Batteries of the EV's don't complete their charging cycles regularly, if they stay inactive most of the time
- It's recommended for Li-ion batteries to work in between 20% and 80% SOC
- Long-term unused batteries have shorter lifespan.

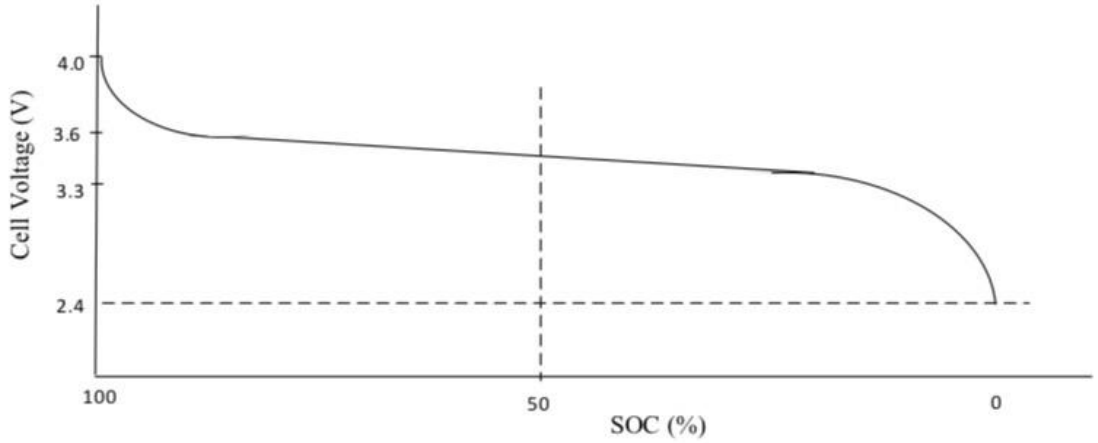


Figure 5 Typical Li-ion Cell Voltage vs SOC *

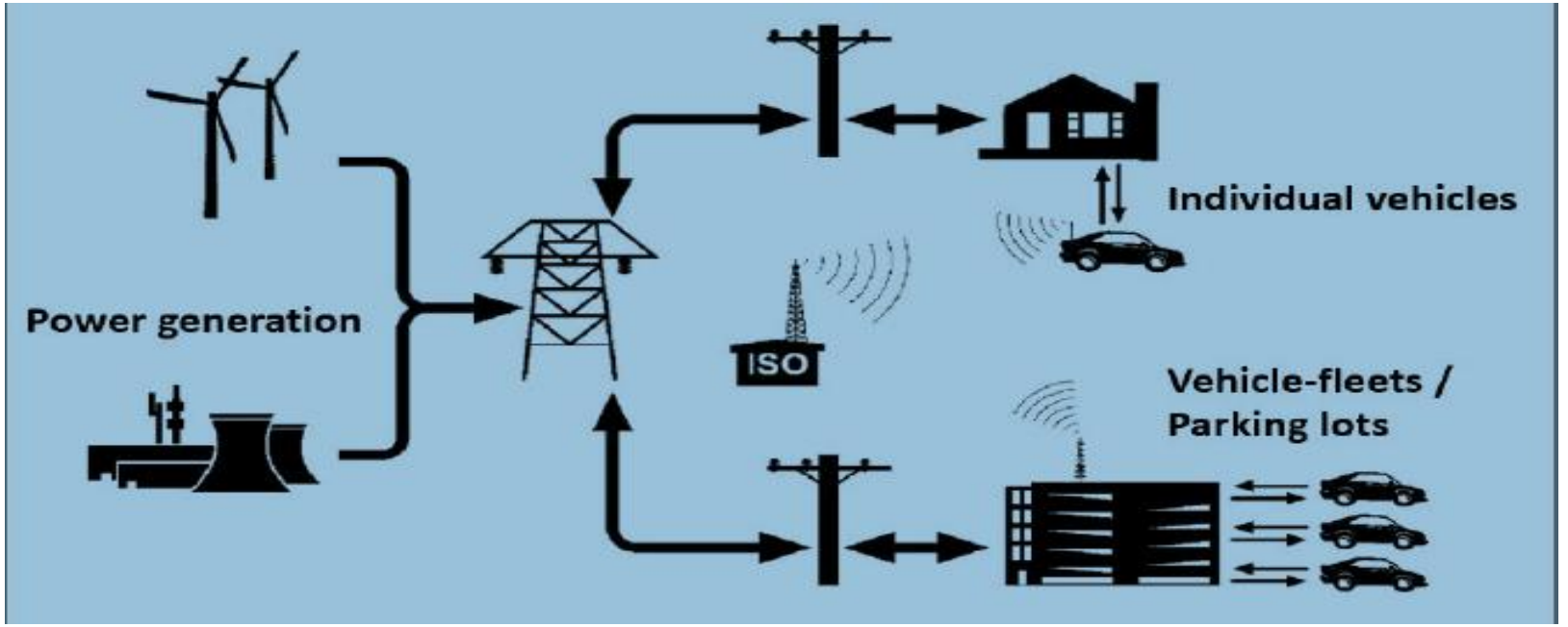
- Thus batteries must be charged and discharged regularly.

** Massey, S. (2016). Modeling, Simulation And Control of Hybrid Electric Vehicle Drive While Minimizing Energy Input Requirements Using Optimized Gear Ratios*

Solution

back2grid provides the services as follows;

- Selling stored energy to the grid at the most profitable time periods.
- Extending battery lifespan with regular charging.
- Also responding to the power demand immediately.



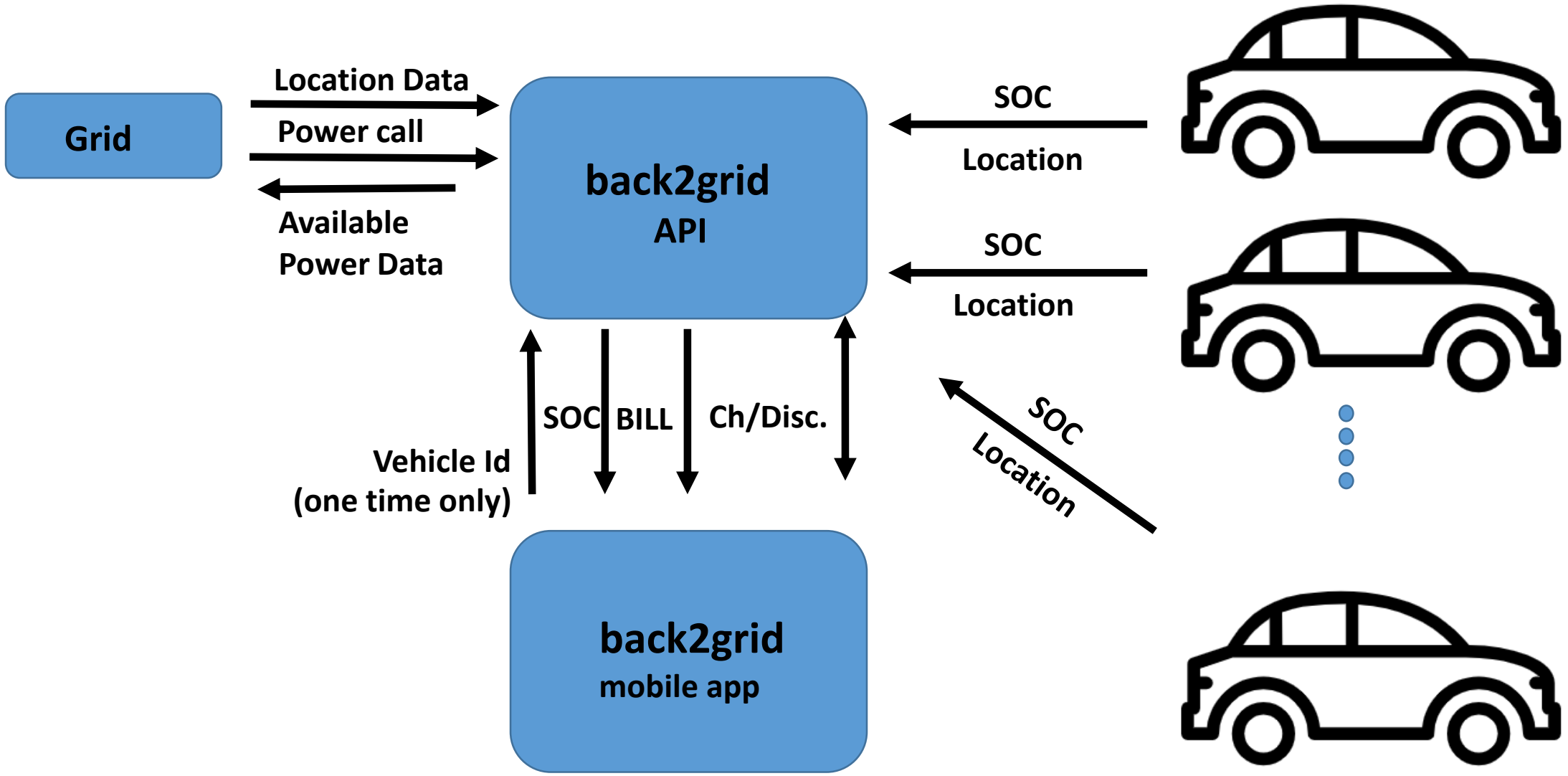
** Deivanayagam, R., Vehicle-to-grid Technology: Concept, Status, and Challenges*

Product

back2grid :

- Is a communication tool between battery and the grid.
- Asks the owner, via mobile application, if they want to charge or discharge the battery of their vehicles.
- Notifies the data of SOC to the owner via mobile application
- Sells stored energy to the grid
- Notifies the bill of running and stored energy to the owner via mobile application
- Does not discharge further if the SOC of the battery is lower than %20 to meet customers’ possible needs.

Product


Grid
Location Data
Power call
Available
Power Data
back2grid
API
SOC
Location
SOC
Location
SOC
Location
SOC
BILL
Ch/Disc.
Vehicle Id
(one time only)
back2grid
mobile app

Scenario

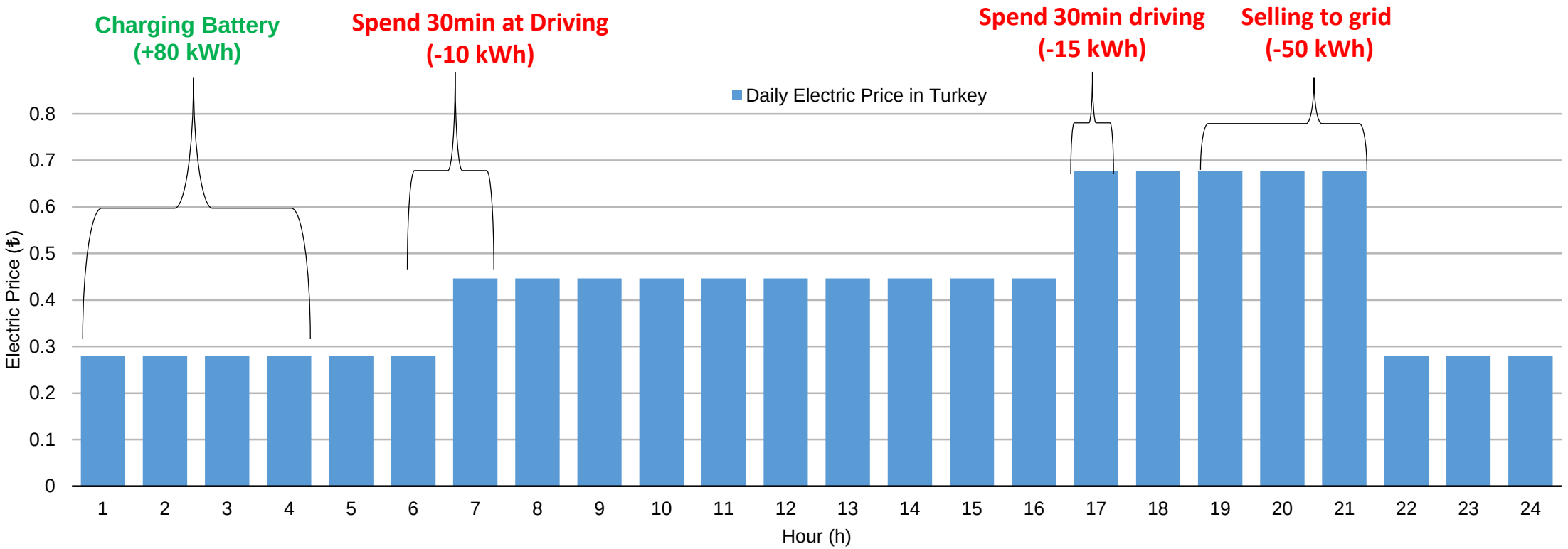
Ali is an engineer.
He lives in Maslak.
He works in Ataköy.
He owns an electric vehicle.

Every workday Ali drives:

- from Maslak to Ataköy between the hours **06:30 - 07:00**, travelling **30km,** spending **10kWh energy**
- from Ataköy to Maslak between the hours **17:00 -17:30,** travelling **30 km,** spending **15kWh of energy**

Ali’s electric car is used **only one hour** in a day.

Scenario



If Ali sells 50 *kwh energy* daily in a month: $0.6\,₺ \times 50\ kwh \times 30\ \text{day} = 900\,₺$ earned

If Ali buys 80 *kwh energy* daily in a month: $0.3\,₺ \times 80\ kwh \times 30\ \text{day} = 720\,₺$ spend

Monthly income overall : $180\,₺$

Scenario

- If this scenario is applied to trucks or buses, their profit could be higher.

Impact

Customer benefits (Electric vehicle owners, leasing companies)

- Extend battery life with regular charge
- Create revenue model with selling the stored energy

Mercedes benefits

- This product is exclusive for Mercedes customers
- Increases the Mercedes brand value
- Encourges the use of electric vehicles

Grid benefits

- Active power and load regulation
- Saving money because establish and manage the backup power plant
- EV can be combined with renewable energy systems.

Future of back2grid

- With further improvements, back2grid can be integrated with an artificial intelligence that estimates optimum buying and selling prices of energy thus provides the customer with higher profits.