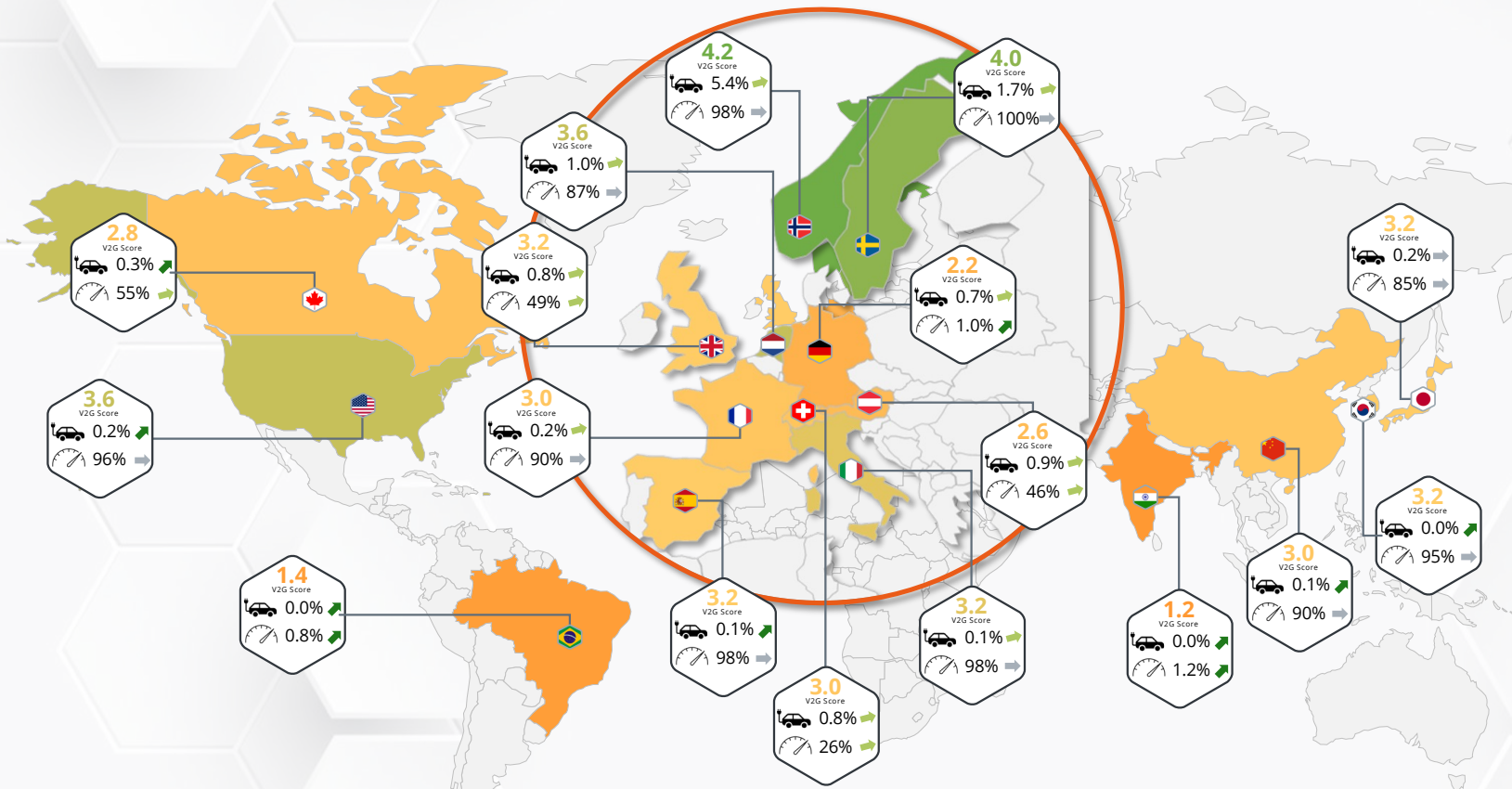


# V2G READINESS WORLDWIDE

The Nordics, the Netherlands and the United States are currently leading the V2G Readiness



| Rank | Country     | V2G Score |
|------|-------------|-----------|
| 1.   | Norway      | 4.2       |
| 2.   | Sweden      | 4.0       |
| 3.   | Netherlands | 3.6       |
| 4.   | USA         | 3.6       |
| 5.   | Italy       | 3.4       |
| 6.   | Japan       | 3.2       |
| 7.   | South Korea | 3.2       |
| 8.   | Spain       | 3.2       |
| 9.   | UK          | 3.2       |
| 10.  | China       | 3.0       |
| 11.  | France      | 3.0       |
| 12.  | Switzerland | 3.0       |
| 13.  | Canada      | 2.8       |
| 14.  | Austria     | 2.6       |
| 15.  | Germany     | 2.2       |
| 16.  | Brazil      | 1.4       |
| 17.  | India       | 1.2       |

| V2G Score Parameters |                                      |
|----------------------|--------------------------------------|
| ■                    | Households with V2G capable vehicles |
| ■                    | Smartmeter Penetration Rate          |
| ■                    | V2G Projects                         |

Source: Berylls Strategy Advisors, IHS Production and Sales Data

5.0 V2G-Score (1 lowest, 5 highest)

Smart meter penetration rate (in %)

Households with V2G Capable Vehicles (in % of total households)



## BERYLLS V2G ANALYSIS

Authors: Dr. Alexander Timmer, Lars Behr, Rishab Harlalka

In the worldwide movement towards carbon neutrality Germany aims to reach 80% in renewable electricity share by 2030 from around 50% in 2023. This increased share of renewable energies (wind, solar and hydro) also necessitates temporary storage of electric energy to stabilize the electric grid. A prominent and cost-effective way to increase storage capacity drastically and thereby stabilize energy supply is the integration of electric car batteries into the electricity grid. The method to not only charge car batteries from the electric grid, but also supply energy back from the car to households or factories through grid is known as V2G (vehicle to grid).

V2G serves as an alternative to other grid stabilization options such as pumped storage power plants, with few suitable locations left, or the significantly more expensive stationary battery storage. In the long run, commercial returns from V2G can reduce the total cost of ownership of an EV through reduction in charging and overall electricity bill.

The V2G score corresponds to the readiness of a country to utilize V2G potential. The most significant factors for the same are smart meter rollout (to enable bidirectional energy flow between EVs and grid) and share of V2G capable EVs in the fleet. The study shows that the V2G potential in most countries is not limited by smart meter roll-out, but the amount of available V2G capable vehicles. It also strikingly shows that Germany is significantly behind the leading nations in terms of V2G readiness. This is mainly due to a very low smart meter rollout in the country so far (around 1% of all household are equipped with a smart meter currently). The smart meter rollout in Germany was slowed down in the past by regulatory uncertainties and a lack of dynamic electricity pricing models requiring the smart meters. In the beginning of 2023, a new law came into place requiring a 95% smart meter rollout by 2032.

So far V2G has only been demonstrated through pilot projects and studies. For unleashing its true potential, both electrical and electric vehicle (EV) infrastructure of a country plays a prominent role. For example the amount of required charging points is increased, as vehicles serving as grid stabilizers block the charging point for this time.

If you want to discuss the opportunities and challenges that come with V2G, please feel free to contact [Dr. Alexander Timmer](#).



## **MOST IMPORTANT TAKEAWAYS**

Authors: Dr. Alexander Timmer, Lars Behr, Rishab Harlalka

- » In the worldwide movement towards carbon neutrality Germany aims to reach 80% in renewable electricity share by 2030 from around 50% in 2023. This increased share of renewable energies (wind, solar and hydro) also necessitates temporary storage of electric energy to stabilize the electric grid.
- » A prominent and cost-effective way to increase storage capacity drastically and thereby stabilize energy supply is the integration of electric car batteries into the electricity grid. The method to not only charge car batteries from the electric grid, but also supply energy back from the car to households or factories through grid is known as V2G (vehicle to grid).
- » V2G serves as an alternative to other grid stabilization options such as pumped storage power plants, with few suitable locations left, or the significantly more expensive stationary battery storage.
- » In the long run, commercial returns from V2G can reduce the total cost of ownership of an EV through reduction in charging and overall electricity bill.
- » The V2G score corresponds to the readiness of a country to utilize V2G potential. The most significant factors for the same are smart meter rollout (to enable bidirectional energy flow between EVs and grid) and share of V2G capable EVs in the fleet.
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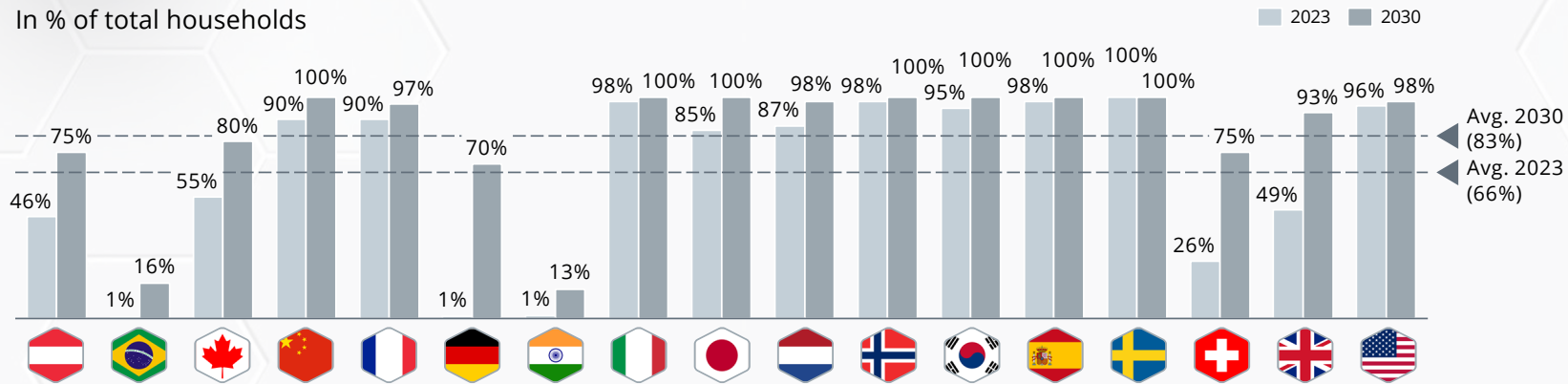


# V2G GROWTH IN KEY MARKETS

A strong growth is expected in the V2G capable vehicles, which combined with the increasing smart meter penetration rate presents significant monetization opportunities.

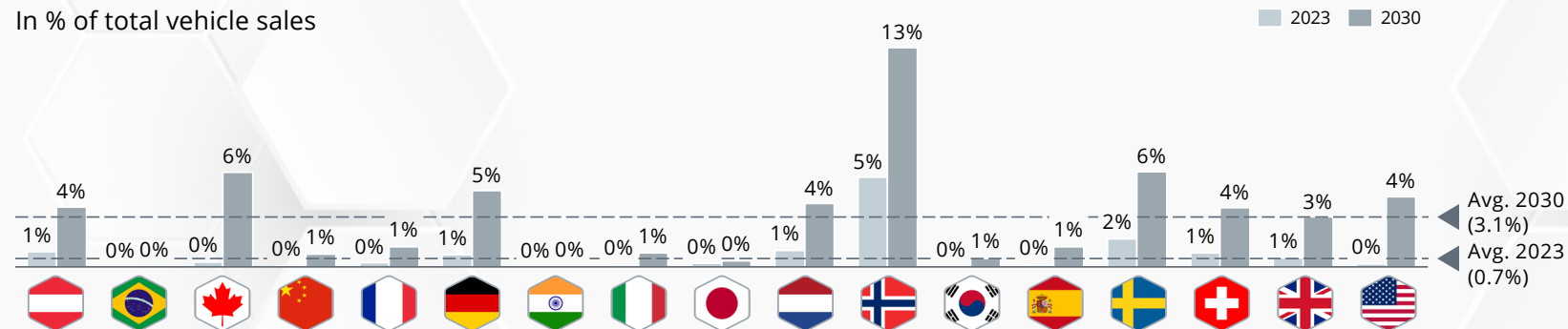
## HOUSEHOLDS WITH V2X (V2G/V2H) CAPABLE BEV'S IN KEY MARKETS

In % of total households



## FLEET SHARE OF V2G-CAPABLE BEV'S IN KEY MARKETS

In % of total vehicle sales



Source: Berylls Strategy Advisors, IHS Production and Sales Data

## KEY INSIGHTS

- » For most European countries, the bottleneck for V2G is compatible vehicles not homes
- » V2G capable vehicle penetration correlates closely to the strength of EV-markets.
- » Current smart meter roll-out mainly driven by legislation – drastic differences between European countries

