

# IoTecha

Accelerate Electrification



## From the dawn of electric vehicles to a fully electrified world

Electric vehicles are everywhere now, and that's no exaggeration. Gone are the days when private cars were the only type of transportation to be electrified — today, cargo trucks, buses, motorcycles, boats, planes, delivery vans, and more have joined their ranks in countries all over the world, alongside specialized infrastructure to support all manner of electric transportation.

The infrastructure that makes these vehicles work together with the energy ecosystem is perhaps even more transformative than the explosion of electrified transportation itself. But the process of developing this still-growing electric vehicle (EV) support did not happen overnight, nor did it happen on its own. So how did we get here? What makes this network tick? And what does all this mean for where we're headed?

## How IoTecha and its partners are building the future of infrastructure

The answers to these questions are complex and multifaceted, involving thousands of people who have been working for years to divest our world from non-renewable energy sources and all the geopolitical baggage that comes with them. A vital common thread weaving all these efforts together is the story of IoTecha — a company that is helping create a large-scale, unified EV charging system through cross-industry collaboration, where all the moving parts are interoperable with each other.

By focusing on interoperability and connectivity between vehicles, chargers, the power grid, and the energy environment at large, the people behind IoTecha helped set the stage early on for the wide-scale electrification of vehicles of all kinds. But in doing so, they also achieved

something else – creating the conditions for electrification to eventually transform society itself and meet head-one climate challenges that affect all of us.

### **Before digging into where we are today, let's take a look at how far we've come.**

As we all remember, the first hybrid EV to gain widespread popularity was the Toyota Prius. However, while the Prius was an important step toward greening the auto industry, it was still an island of increased sustainability in a sea of untapped potential. Even with the advent of the next major disruption in the EV industry years later, the all-electric Tesla Roadster which triggered a boom for EVs, the opportunities that EVs presented for the auto industry remained largely underutilized. In addition, the Roadster and other all-electric vehicles ushered in an era where a plethora of different charging methods and connectors appeared on the market, making the prospect of an interconnected global charging network that worked for everyone increasingly difficult.

To simplify charging and move the relationship between the EV driver and the energy domain forward, the way that vehicles interacted with chargers and the power grid had to change. That's where the future founders of IoTecha came in: in the late 2000s and early 2010s, they were part of an industry-wide movement to create a unified standard for EV chargers that would allow vehicles to connect with the power grid more directly and efficiently than ever before. This standard became known as ISO 15118, and having spearheaded this and other innovations, the founders of IoTecha established the company itself in 2016 to create products that accelerate the smart electrification of the auto industry at large. To meet this goal, IoTecha collaborated and continues to work with

other players in the EV sector to encourage the adoption of the Combined Charging System (CCS), which implements ISO 15118, as the basis for interoperability within the industry.

Why is this so important? As the nationwide, sustainable charging network continued to develop, IoTecha's products allowed charger manufacturers to produce intelligent chargers more easily, more rapidly, and more efficiently, while also creating improved communication between vehicles, chargers, and the energy grid itself.

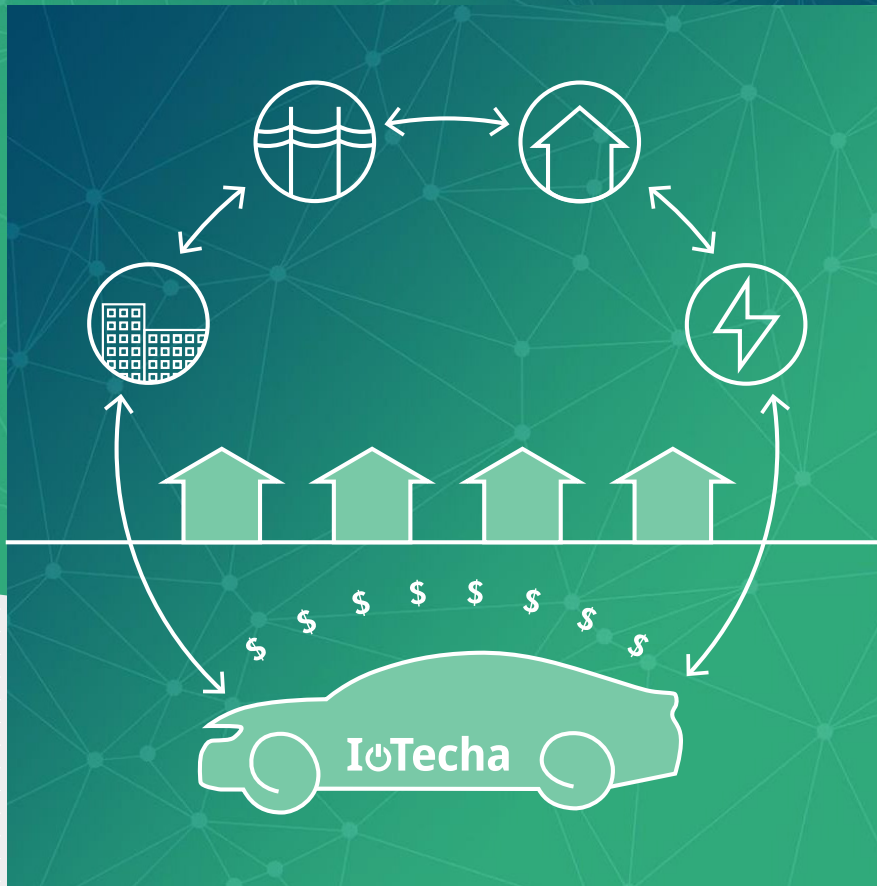
Below, we can see the impact these technologies have had on the ability of a hypothetical customer, whom we'll call Nadya, to interact with the energy ecosystem around her. With opportunities for interoperability between chargers, vehicles, and grids, Nadya's vehicle can now not only be connected to the local power grid in a bi-directional fashion, but also to her home, her neighborhood, and more. Nadya and her vehicle are now able to distribute the charging load evenly through this system, save on electricity costs by selling power back to the grid, and create a more sustainable, less wasteful energy environment.

**Years after realizing the potential that auto electrification holds for our society, IoTecha's products like white-label chargers, testing equipment, cloud services, and more have decreased the costs of electrification, creating the foundation for a fully integrated energy environment.**

As the EV industry has continued to develop over the six years since IoTecha was founded, aided by investments in the development of a nationwide charging network, IoTecha has taken an ecosystem approach toward expanding EV infrastructure and making it more efficient,



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more economical, and more accessible than ever. Although the industry still has a long way to go, IoTecha has been able to produce tangible dividends for businesses, individual users, and the energy domain at large, and has worked with vehicle manufacturers, EV charging network operators, and more to make that happen.

As we've already touched on, the first step in creating an EV infrastructure that works for all of us is interoperability, and several of IoTecha's products have made interoperable charging easier than ever.

IoTecha's charging solutions implement a variety of features that are crucial for sector-wide interoperability, including bi-directional power flow and Plug and Charge capability. The ISO 15118 standard makes vehicle-to-grid (V2G) communication possible, connecting vehicles with smart electric grids through the charging hardware. ISO 15118 is also used for Plug and Charge, which automates authentication and payment for charging and further simplifies the charging process. This last point is what these features are all about — making sure that charging EVs is as easy and intuitive for customers as charging smartphones.

Yet despite the benefits these solutions have given EV drivers and charging network operators, we're still missing a crucial piece of the puzzle — a mechanism through which the charging system's V2G capabilities can be customized to fit the energy environment that charging stations are part of. This is where IoT.ON, IoTecha's modular Internet of Things (IoT) platform, comes into play.

IoT.ON is a user-friendly, cloud-based tool that gives operators the ability to manage the way chargers and EVs interact with the grid through intuitive visualizations, unlocking the full potential of smart charging. With IoT.ON, charging station operators can achieve substantial savings on energy costs by implementing energy management strategies such as peak shaving, which cuts down on high electricity consumption peaks in a charging interval by intelligently distributing the load across devices in the ecosystem.

Peak shaving is only one example however, and IoT.ON has a range of customizable settings and modes through which operators can manage tens of thousands of devices distributed across a wide geographic range. Only by using a secure, scalable, and extensible platform can a standards-based charging infrastructure enable ubiquitous EV adoption across the world, and across transportation applications. In the process, by collecting data and putting it to use through artificial intelligence, IoT.ON opens up an exciting array of possibilities for the future of our built infrastructure that we can only begin to imagine today.

Below, we can see how IoT.ON enables individual actors within the energy ecosystem to distribute the charging load across various devices, buildings, and modes of transportation within the network to make charging as cheap, intelligent, and scalable as possible.

By lowering the barrier to the widespread implementation of EV charging infrastructure, IoTecha is giving individual drivers, station operators, EV fleet managers, and many



other players the ability to tailor charging systems to their specific energy needs. Each individual actor in this network can contribute in its own small way to making the emerging nationwide EV network ever more harmonious, accessible, and efficient, shepherding our communities toward a fully electrified reality.

**A fully electrified future is no longer a pipe dream and could be achieved by extending the innovations that IoTecha and its partners in the auto industry have developed to a host of new domains, creating an energy-efficient, responsive, and data-powered world.**

The total electrification of our society will take some time, but could ultimately result in a reality where everything, including personal devices, homes, businesses, apartment buildings, utility infrastructure, transportation networks on land, air, and sea, and entire urban areas work in concert with everything else. As we've seen from tools like IoT.ON, such an ultra-connected infrastructure would potentially yield a treasure trove of data that would then be used to inform how we live, the kinds of opportunities we create for each other, and how efficiently we manage our communities. If everything falls into place these vast datasets could lead to the development of optimized economies, smart cities, and AI-assisted politics.

This revolution in data utilization could create immense benefits for our civilization if used responsibly, but will likely also trigger new debates around privacy, government oversight, and corporate control. The key for balancing efficient data-driven organization with an equitable

distribution of decision-making power, privacy rights guarantee, and protection of individual liberties will be the decentralization of managerial authority over energy and data governance to the community level, where individuals, acting in the best interest of themselves and their neighbors, will be able to be the masters of their own energy destinies – just like Nadya and Tim are within today's EV ecosystem.

The electrification of our world would bring enormous progress, giving us the tools to create dynamic communities that respond to the behaviors of the people who live with them and stave off the worst climate change scenarios – but in order to address the emergent externalities of this reality, we must approach this future with appropriate reverence and forethought. By working together over the coming decades, we can learn from our collective experiences in the auto industry to set ourselves up for success in the long term, beyond just the next product launch. This is the approach IoTecha has always taken and continues to foster with a wide swathe of players in the EV sector to create today the conditions for tomorrow's successes.

How boldly we wish to move toward a totally electrified future will be a central question that politicians, business leaders, consumers, and researchers will have to answer as the 21<sup>st</sup> century progresses. But what we can do today is make sure we overcome our differences to intelligently respond to the great hurdles our civilization faces right here, right now. Let's dream big, let's use the tools at our disposal to their full potential, and let's continue to open new opportunities to better our world – one EV charger at a time.