

F R O S T & S U L L I V A N

FROST & SULLIVAN BEST PRACTICES AWARD

GRID OPTIMIZATION - EUROPE

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New Product Innovation 2019

 envelio

FROST & SULLIVAN

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2019

BEST  
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## Background and Company Performance

### *Industry Challenges*

Europe's electricity sector is transitioning from a centralized structure anchored by baseload power plants to a decentralized framework spurred by the penetration of renewable sources of energy. Two major changes are contributing to grid complexity: integration of solar and wind energy and adoption of electric vehicles that require the installation and use of battery charging infrastructure.

Simply put, existing information technology (IT) systems cannot deal with these changes. Legacy IT solutions, such as grid simulation tools or SCADA, used by prominent utilities are inflexible and cannot handle large amounts of data that result from decentralized sources of energy generation; they are designed to handle conventional baseload power plants.

Decentralization of the energy network has created the need to develop an innovative and intelligent grid optimization solution that adds a degree of flexibility and can handle large amounts of decentralized data.

### *New Product Attributes and Customer Impact*

#### **Match to Needs**

envelio, a German company with expertise in smart grids and grid optimization, has developed the Intelligent Grid Platform (IGP) that addresses a range of technical processes in the distribution grid. As part of its digital solution, envelio offers software apps to distribution system operators (DSOs) that cover the following aspects:

- IGP Data Quality
- IGP Operation
- IGP Planning

#### *Digital Twin Model – Enabling Automation and Digitization*

Grid data quality is one of the core aspects targeted by envelio's IGP solution and is the validated data basis that ensures automation of grid planning and operation processes. IGP data quality applications allow use and combination of data from existing systems such as enterprise resource planning (ERP), geographic information system (GIS), and measurement data. The data collected from these legacy data systems is integrated, combined and automatically cleaned up to form a digital twin of the power grid, which provides the possibility to automate many processes. This digital twin model forms the basis for IGP Operation and IGP Planning.

Frost & Sullivan acknowledges the digital twin model is a core aspect of envelio's Intelligent Grid Platform and sets the foundation for solving challenges associated with large amounts of data. While SCADA systems are good at performing simulations, the gathering and processing of raw data to perform the simulations is not very efficient. envelio's IGP data quality applications can handle large amounts of data that cannot be handled by competing solutions in the market and exhibit a higher degree of automation. The automation allows for faster integration of renewable energy sources into the grid.

Typical grid planning processes that are automated by the IGP are for example connection impact analyses for new generators or consumers or large-scale grid studies. In traditional grid simulation software solutions, forming a digital model of the grid is predominantly a manual process and therefore both time-consuming and tedious. In contrast, envelio's IGP grid planning app makes this entire process highly automated, the degree of which is unseen among envelio's key competitors in the grid optimization space. The algorithms that underpin the IGP Data Quality app repair and fix any inconsistencies in data and help in developing the best possible digital twin model, which gives a full picture of the grid.

## **Reliability and Quality**

### Open Platform

IGP allows for data to be collected from different sources, with or without sensors. Still, the platform is flexible enough to be integrated among different types of sensors for data collection. On the one hand, the intelligent platform can be integrated with grid hardware sensors present at substations (integrated by SCADA protocols for higher voltage levels), third-party sensors with a different data pack, or even smart meter sensors. In addition, IGP can be connected to existing IoT devices in the network as well, and therefore there is no need for additional installation of sensors. For example, envelio works with SMA, a German solar inverter manufacturer, to utilize the latter's measurements taken on the grid side and then integrated with the IGP via an API. This open platform approach avoids additional costs the DSO would have to bear for installing sensors as the sensors are already present as part of the SMA product.

### Cloud Capability & Scalability

envelio's IGP solution uses client server architecture where the server side can be cloud hosted as well as on-premise deployed. The possibility of cloud hosting makes IGP more flexible compared to competing solutions, which are not yet as sophisticated. Being a newly developed solution makes it easier for envelio to integrate new tech specs that allow for cloud capability in comparison to competing solutions. With the addition of cloud capability, the server capacity can be increased thereby adding a degree of redundancy into the system. In case there is a failure, the new server can be up and running without affecting operations significantly. In contrast, competitors either do not have any or are currently working on building cloud capabilities, but they are certainly not native cloud solutions. envelio's IGP works with the latest tech specs on the IT side (cloud-based) and has made modifications to adapt the solution for on-premise deployment (which is not cloud-based). Moreover, cloud hosting can be performed with different cloud providers such as AWS, Microsoft Azure, or Telekom. Frost & Sullivan appreciates that this feature enhances the intelligent grid platform's flexibility.

Frost & Sullivan is also impressed that envelio offers an open platform that has the flexibility to integrate with different data sources to attain the best data transparency possible, thereby offering a chance to reduce costs. Furthermore, the superior data gathering and processing capabilities in comparison to existing solutions stands out as a

unique selling point of the IGP platform. The scalability of envelio's software platform prepares grid operators for the next phase of energy transition — decentralization.

### Competitors

The main competitors of envelio are the established players offering solutions in grid optimization and grid management. While the grid optimization solutions offered by these competing solutions are state-of-the-art, they are not yet capable of dealing with the large amounts of data generated by increasing integration of distributed energy sources (DERs). Moreover, envelio focuses its solutions for the distribution level as against the established competitors (e.g. SCADA system provider) who lack the mass data capabilities for the distribution level and are tailored towards the transmission side. As DERs become more prominent, there will be more importance on the distribution side, and this can be leveraged by envelio.

## **Design**

### UX Design

envelio's IGP uses a relatable and modern software interface that is consumer-friendly as opposed to typical engineering software that have too many functionalities for performing various tasks. The IGP apps are optimized to include only the functionalities that are required for the business process that an operator focuses on.

### Example – Evaluating grid connection requests

When a consumer or developer decides to put up a decentralized power plant at a location, he/she has to request the grid operator to perform a connection impact analysis. The grid connection request is processed by conducting a technical and economic evaluation. Typically, this is a very cumbersome process involving a lot of documentation and delays. For the user, it is painstaking because it can take 2 to 3 weeks to get feedback from the grid operator. For the grid operator, it involves manual modeling, which is again time-consuming.

IGP simplifies this approach by digitizing the entire grid connection process and executing everything online. The consumer can use an on-line map to choose the location where the decentralized unit is to be installed and then request an evaluation. The software performs technical simulations to determine project feasibility. By using IGP, the time taken for the entire grid connection evaluation process reduces from 2 to 3 weeks to just 30 seconds by offering electronic feedback directly from the website.

With customer satisfaction being a key enabler for developing products today, Frost & Sullivan believes the superior UX design of envelio's IGP will go a long way in giving the company an edge over competing solutions. Frost & Sullivan lauds envelio for introducing an industry best practice with its modern and fresher user interface that is more relatable and approachable for the customer.

## Positioning

The research that underpins development of envelio's IGP spanned a period of more than 5 years. The co-founders are alumni of RWTH Aachen University, one of the foremost technical universities in Germany with strong focus on energy systems. The researchers have extensive technical experience in smart grids and grid optimization, and partnered with industry majors such as Siemens as part of their research. The researchers later focused on utilizing their research expertise to develop a solution that can benefit grid operators.

The platform was developed based on sophisticated algorithms that cover areas such as machine learning and grid optimization, and has its roots in 5 PhD theses (created by the co-founders).

To help the company expand in the German and larger European market, High-Tech Gründerfonds (HTGF), a public-private investment firm that focuses on start-ups, and Demeter, a major European player in private equity for ecological and energy transition, have invested a total of one million euros in envelio. Envelio's current customer base includes E.DIS (subsidiary of E.ON) and Westnetz, the largest DSO in Germany with a 10% market share. With the IGP solution, envelio has generated 65,000 low voltage grid models for Westnetz, which translates to 4.8 million customers that are connected to the grid. envelio is also making efforts to expand internationally by collaborating with Iberdola and Enel for projects in Spain and Brazil, respectively.

Frost & Sullivan finds the strong technical background that envelio leverages in combination with funding from investment firms that have backed major success stories, provides it a unique advantage in establishing itself as a player that can compete in offering state-of-the-art grid optimization solutions at a pivotal moment in the energy sector's transformation.

## Conclusion

The increasing penetration of renewable energy and electric mobility has created grid instability that is difficult to manage with existing SCADA or simulation solutions that cannot handle large amounts of data coming from decentralized energy sources. envelio has developed a grid optimization software platform, IGP (Intelligent Grid Platform), which uses a sophisticated digital twin model based on algorithms from research conducted at RWTH Aachen University, Germany. This digital platform has the ability to handle large amounts of data and automate typical technical grid planning and operation processes. While its cloud capabilities add a degree of scalability to the platform, the unique design eases software usability and enhances UX. The company's strong research background, funding from notable investment firms, and work with international customers position envelio attractively for market expansion.

For its strong overall performance, envelio is recognized with earned Frost & Sullivan's 2019 New Product Innovation Award.

## Significance of New Product Innovation

Ultimately, growth in any organization depends on continually introducing new products to the market and successfully commercializing those products. For these dual goals to occur, a company must be best in class in three key areas: understanding demand, nurturing the brand, and differentiating from the competition.



## Understanding New Product Innovation

Innovation is about finding a productive outlet for creativity—for consistently translating ideas into high-quality products that have a profound impact on the customer.

## *Key Benchmarking Criteria*

For the New Product Innovation Award, Frost & Sullivan analysts independently evaluated two key factors—New Product Attributes and Customer Impact—according to the criteria identified below.

### *New Product Attributes*

#### **Criterion 1: Match to Needs**

Requirement: Customer needs directly influence and inspire the product's design and positioning.

#### **Criterion 2: Reliability**

Requirement: The product consistently meets or exceeds customer expectations for consistent performance during its entire life cycle.

#### **Criterion 3: Quality**

Requirement: Product offers best-in-class quality, with a full complement of features and functionalities.

#### **Criterion 4: Positioning**

Requirement: The product serves a unique, unmet need that competitors cannot easily replicate.

#### **Criterion 5: Design**

Requirement: The product features an innovative design, enhancing both visual appeal and ease of use.

### *Customer Impact*

#### **Criterion 1: Price/Performance Value**

Requirement: Products or services offer the best value for the price, compared to similar offerings in the market.

#### **Criterion 2: Customer Purchase Experience**

Requirement: Customers feel they are buying the optimal solution that addresses both their unique needs and their unique constraints.

#### **Criterion 3: Customer Ownership Experience**

Requirement: Customers are proud to own the company's product or service and have a positive experience throughout the life of the product or service.

#### **Criterion 4: Customer Service Experience**

Requirement: Customer service is accessible, fast, stress-free, and of high quality.

#### **Criterion 5: Brand Equity**

Requirement: Customers have a positive view of the brand and exhibit high brand loyalty.



## Best Practices Recognition: 10 Steps to Researching, Identifying, and Recognizing Best Practices

Frost & Sullivan analysts follow a 10-step process to evaluate award candidates and assess their fit with select best practices criteria. The reputation and integrity of the awards are based on close adherence to this process.

STEP	OBJECTIVE	KEY ACTIVITIES	OUTPUT
1 <b>Monitor, target, and screen</b>	Identify award recipient candidates from around the world	<ul style="list-style-type: none"> <li>• Conduct in-depth industry research</li> <li>• Identify emerging industries</li> <li>• Scan multiple regions</li> </ul>	Pipeline of candidates that potentially meet all best practices criteria
2 <b>Perform 360-degree research</b>	Perform comprehensive, 360-degree research on all candidates in the pipeline	<ul style="list-style-type: none"> <li>• Interview thought leaders and industry practitioners</li> <li>• Assess candidates' fit with best practices criteria</li> <li>• Rank all candidates</li> </ul>	Matrix positioning of all candidates' performance relative to one another
3 <b>Invite thought leadership in best practices</b>	Perform in-depth examination of all candidates	<ul style="list-style-type: none"> <li>• Confirm best practices criteria</li> <li>• Examine eligibility of all candidates</li> <li>• Identify any information gaps</li> </ul>	Detailed profiles of all ranked candidates
4 <b>Initiate research director review</b>	Conduct an unbiased evaluation of all candidate profiles	<ul style="list-style-type: none"> <li>• Brainstorm ranking options</li> <li>• Invite multiple perspectives on candidates' performance</li> <li>• Update candidate profiles</li> </ul>	Final prioritization of all eligible candidates and companion best practices positioning paper
5 <b>Assemble panel of industry experts</b>	Present findings to an expert panel of industry thought leaders	<ul style="list-style-type: none"> <li>• Share findings</li> <li>• Strengthen cases for candidate eligibility</li> <li>• Prioritize candidates</li> </ul>	Refined list of prioritized award candidates
6 <b>Conduct global industry review</b>	Build consensus on award candidates' eligibility	<ul style="list-style-type: none"> <li>• Hold global team meeting to review all candidates</li> <li>• Pressure-test fit with criteria</li> <li>• Confirm inclusion of all eligible candidates</li> </ul>	Final list of eligible award candidates, representing success stories worldwide
7 <b>Perform quality check</b>	Develop official award consideration materials	<ul style="list-style-type: none"> <li>• Perform final performance benchmarking activities</li> <li>• Write nominations</li> <li>• Perform quality review</li> </ul>	High-quality, accurate, and creative presentation of nominees' successes
8 <b>Reconnect with panel of industry experts</b>	Finalize the selection of the best practices award recipient	<ul style="list-style-type: none"> <li>• Review analysis with panel</li> <li>• Build consensus</li> <li>• Select recipient</li> </ul>	Decision on which company performs best against all best practices criteria
9 <b>Communicate recognition</b>	Inform award recipient of recognition	<ul style="list-style-type: none"> <li>• Present award to the CEO</li> <li>• Inspire the organization for continued success</li> <li>• Celebrate the recipient's performance</li> </ul>	Announcement of award and plan for how recipient can use the award to enhance the brand
10 <b>Take strategic action</b>	Upon licensing, company is able to share award news with stakeholders and customers	<ul style="list-style-type: none"> <li>• Coordinate media outreach</li> <li>• Design a marketing plan</li> <li>• Assess award's role in strategic planning</li> </ul>	Widespread awareness of recipient's award status among investors, media personnel, and employees

## The Intersection between 360-Degree Research and Best Practices Awards

### Research Methodology

Frost & Sullivan's 360-degree research methodology represents the analytical rigor of the research process. It offers a 360-degree view of industry challenges, trends, and issues by integrating all 7 of Frost & Sullivan's research methodologies. Too often companies make important growth decisions based on a narrow understanding of their environment, resulting in errors of both omission and commission. Successful growth strategies are founded on a thorough understanding of market, technical, economic, financial, customer, best practices, and demographic analyses. The integration of these research disciplines into the 360-degree research methodology provides an evaluation platform for benchmarking industry participants and for identifying those performing at best-in-class levels.

### 360-DEGREE RESEARCH: SEEING ORDER IN THE CHAOS



## About Frost & Sullivan

Frost & Sullivan, the Growth Partnership Company, helps clients accelerate growth and achieve best-in-class positions in growth, innovation, and leadership. The company's Growth Partnership Service provides the CEO and the CEO's growth team with disciplined research and best practices models to drive the generation, evaluation, and implementation of powerful growth strategies. Frost & Sullivan leverages nearly 60 years of experience in partnering with Global 1000 companies, emerging businesses, and the investment community from 45 offices on 6 continents. To join Frost & Sullivan's Growth Partnership, visit <http://www.frost.com>.