Enhancing cyber resilience in electricity systems

Part of Electricity Security 2021
Launch presentation – 12 April 2020
The electricity system is increasingly digitalising...

Investment in electricity networks, 2014-2019

Connected devices worldwide, 2010-2030


...bringing many benefits for electricity and clean energy transitions

<table>
<thead>
<tr>
<th>Generation</th>
<th>Transmission &amp; distribution</th>
<th>Consumers and DERs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved efficiency</td>
<td>Improved efficiency of assets and wider system operations</td>
<td>Demand response, including vehicle-to-grid (V2G)</td>
</tr>
<tr>
<td>Predictive maintenance</td>
<td>Predictive maintenance</td>
<td>Demand forecasting</td>
</tr>
<tr>
<td>Reduced downtime</td>
<td>Reduced downtime with faster fault localisation</td>
<td>Energy management</td>
</tr>
<tr>
<td>Lifetime extension</td>
<td>Lifetime extension</td>
<td>Smart buildings</td>
</tr>
<tr>
<td>Renewables forecasting</td>
<td>Grid stability monitoring</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Enhanced local flexibility options</td>
<td></td>
</tr>
</tbody>
</table>
But digitalisation comes with risks to cybersecurity

Significant cyber incidents (all sectors), 2008-2020

Selected electricity-related cyber incidents in 2020

- Supply chain cyberattack on IT service provider
- Ransomware attack on market operator in the UK
- Ransomware attack on Canadian utility
- Ransomware attack on Portuguese utility
- Intrusion of internal information exchange platform of European TSO association
- Ransomware attack on US equipment vendor

The threat of cyberattack is substantial and growing, and threat actors are becoming increasingly sophisticated at carrying out attacks – both in their ability to identify vulnerabilities and their destructive capabilities.

Note: Significant incidents are defined as cyber-attacks on government agencies, defense and high tech companies, or economic crimes with losses of more than a million dollars.
Source: Center for Strategic and International Studies (2020), Significant Cyber Incidents.
There are numerous potential cyberattack scenarios and impacts

Potential ways an attacker could compromise industrial control systems

Managed service provider
- IT infrastructure
- Support services

Target electricity organisation
- Corporate business network
- Privileged access

Other grid organisations
- Generation
- Transmission
- Distribution
- Inter-control centre communications

Supply chain
- Vendor / Contractor
- New hardware/software
- Software/firmware updates and patches
- Configuration files
- Privileged access

ICS network
- Control centre
- ICS devices
- Physical devices
- Local or remote access

Smart grid
- Connected devices and equipment


A successful cyberattack could trigger the loss of control over devices and processes, in turn causing physical damage and widespread service disruption.
Enhancing cyber resilience is a continuous process

While the full prevention of all attacks is not possible, electricity systems must become more cyber resilient – to withstand, adapt to, and rapidly recover from attacks.
Policy makers are central to enhancing cyber resilience

- **Institutionalise**: set appropriate responsibilities and incentives for relevant organisations within their jurisdiction.

- **Identify risks**: ensure that operators of critical electricity infrastructure identify, assess and communicate critical risks.

- **Manage and mitigate risk**: collaborate with industry to improve readiness across the entire electricity system-value chain.

- **Monitor progress**: ensure mechanisms and tools are in place to evaluate and monitor risks and preparedness, and track progress over time.

- **Respond and recover**: enhance the response and recovery mechanisms of electricity sector stakeholders.
Tailoring policy and regulatory approaches

The regulatory spectrum for ensuring cybersecurity – the balance between prescription and outcome

Mandatory regulations approach
- More prescriptive
- Requirements to meet specific standards ensures:
  + minimum level across networks
  + streamlined monitoring for compliance
  - but regulations can lag behind technology changes and focus more on compliance rather than risk

Framework-based approach
- Less prescriptive
- Establishing common criteria across networks allows:
  + customised approaches to achieve desired outcome
  + focus on outcomes to adapt to evolving risks
  - but variable speed and level of cyber resilience risks weak link or contagion

Implementation strategies should be tailored to national contexts while considering the global nature of risks
Summary

- Digitalisation offers many benefits both for electricity systems and clean energy transitions.
- The threat of cyberattacks on electricity systems is substantial and growing.
- While the full prevention of cyberattacks is not possible, electricity systems can become more cyber resilient.
- Policy makers are central to enhancing the cyber resilience of electricity systems.
- Information sharing can enhance cyber resilience across the system for all electricity sector stakeholders.
- A wealth of existing risk management tools, security frameworks, technical measures and self-assessment approaches are available.
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