



Consultation

Topic: The proposal to introduce a RECCo Application Programming Interface (API) Gateway

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1 Introduction

As RECCo matures as an organisation, we are becoming responsible for an increasing number of services frequently used by the energy industry. Different service providers supply and maintain these services, typically utilising their own Application Programming Interfaces (APIs), allowing users to authenticate, interact and communicate with them. To effectively manage these services going forward, we are proposing the introduction of a RECCo API gateway and are asking for your feedback via this consultation.

The RECCo API Gateway will integrate with existing and new services when they are procured, resulting in most services being accessed via the gateway over time. The API Gateway will provide numerous benefits to RECCo and its service users, including the provision of a single point of access that will result in:

- Improved security;
- Improved visibility of service use;
- Standardised traffic management; and
- A better developer experience.

We have assessed the strategic benefits, risks and mitigations, the economic impact on its service users, and how it should be delivered, managed, and evolve. These are described here alongside a series of questions we would like you to answer. Your responses will inform our business case and implementation of the service.

What is an Application Programming Interface (API) gateway?

An API gateway is a management tool between the end user and a collection of backend services. By introducing an API gateway to the services we are responsible for, REC Parties can access them using a single access point. This will also provide improvements in security, service visibility and efficiency.

The API gateway is a key enabler and industry-standard approach to effective API management. The benefits introduced would be realised across the RECCo services architecture and will support a gradual move to microservices architecture. Microservices architecture is an architectural style for developing applications which allows separation into smaller, independent parts, providing greater flexibility for currently unknown use cases. For REC services, this allows the flexibility for continuous improvement.

2 Strategic Benefit

API Gateways are an established technology known to help improve security and visibility while also acting as an enabler for effective API management strategies. The benefits they bring also contribute to helping development teams improve their delivery cadence. Over time, RECCo's API Gateway will act as a single point of entry to our services and provide strategic benefits in the following areas:

Security:

- Enable the provision of core security features like authentication, authorisation and DDoS (Distributed Denial of Service) protection via a single entry point, delivering the following benefits:
 - RECCo: Increased security and better data protection
 - Service provider: Fewer service users requiring configuration and security management
 - Service user: Single Sign On
- Provide visibility of all service activity from a single source. Dashboards and monitoring of all services via the API Gateway, providing visibility across all services. This shall enable the following benefits:
 - RECCo: Visibility of all services via a single reference point
 - Code Manager: Visibility of services via a single reference point
 - Service user: Visibility of service availability

Traffic Management:

- Reduces the burden of traffic management implementations across services, including rate limiting and burst limits
- Ensures a standardised approach to traffic management across services
- This shall provide the following benefits:
 - Standardisation of Traffic Management
 - Service users shall be better placed to manage their services and maintain availability during peak loads

Onboarding

- Shall simplify the onboarding process for service users, requiring a once-only onboarding process.
- Shall provide a standardised process for developer enablement, simplifying the process and allowing them to progress with development more quickly.
- This shall provide the following benefits:
 - RECCo and RECCo Service provider: Simpler onboarding process
 - Service users: Simpler onboarding process

Rollout and Service Management

- Provides a centrally managed API provisioning and end-of-life service, allowing the use of reduced-risk implementation strategies like canary or blue/green deployments. It shall provide the following benefits:
 - RECCo: De-risk release strategies and reduce the burden of legacy technologies
 - Service user: Managed and transparent releases
 - Developer: Reduce the complexity of release management

Delivery

- Improved delivery cadence as its use shall lead to simpler, easier-to-maintain and implement code. This shall reduce the risks associated with change and deployment and shall provide the following benefits:
 - RECCo: Deliver service changes at a faster pace

- Service user: Service improvements delivered more quickly and with less complexity
- Developer: Reduced development and maintenance burden

Standardisation of Cross-Cutting Functionality

- Cross-cutting functionality includes quota management, rate limiting, and burst rates. It also includes authentication and authorisation and the application of previously mentioned security features. Where features like quota management apply, they are currently incorporated into each service that uses it, which risks variation in the application of the feature across services. A standard policy and process can be applied by incorporating these features in the API Gateway. This provides the following benefits:
 - RECCo: Greater control in the management of the features
 - Service user: A better understanding of the features as a single policy and process is applied
 - Developer: Reduced development and maintenance burden

2.1 Risks & Mitigations

There are several risks associated with the implementation of an API Gateway. The benefits outweigh these, and we have identified clear mitigations for each.

API Gateway as a single point of access to services: Any event resulting in loss of service shall result in all services downstream of

the gateway not being available to users. RECCo shall mitigate against this by:

- Providing a high availability, fault-tolerant service replicated across multiple cloud availability zones and regions and
- Enforcing a policy of zero downtime deployment of change.

Other risks include the API Gateway's impact on latency and scalability of services. RECCo shall ensure these risks are mitigated by:

- The provision of an API Gateway that has a near-zero impact on Round Trip Times between the user and downstream service;
- The provision of an API Gateway that maintains near-zero impact as demand increases and
- Monitoring service use and performance and collaborate with industry to establish and plan for enhancements to manage future workloads and anticipated peaks in demand

2.2 Questions

1. Do you agree with the proposal to introduce a RECCo API Gateway?
2. Do you agree with the strategic benefits outlined?
3. Have we identified all the risks?
4. Do you agree with the mitigations?
5. Does RECCo need to undertake other activities to:
 - Maximise the benefits described.
 - Minimise the risks?

3 Economic Benefit to Industry

The economic case for the implementation of an API Gateway is best illustrated by considering the activities each service user will have to undertake and the resources required to achieve them when:

- An existing service is re-procured, and the contract is awarded to a different service provider, and:
 - Service requests do not traverse an API Gateway
 - Service requests do traverse an API Gateway

The two scenarios shall show there is collectively much more effort incurred by service users when a service is procured without an API Gateway than when one is.

3.1 Impact with No API Gateway

In this scenario, service users must revise their code and validate the changes to ensure their applications still function as required. Hence, they will have to:

- Review the new API's documentation to determine any material differences between the new API, URIs, mandatory and optional fields, responses, and returned data. Determine where change is needed, if the change is a breaking change and how it affects existing test scripts
- Reprint applications to the new API End Points
- Adjust application code to cope with any anomalies
- Validate changes
- Apply the changes when the new service goes live

- Amend their documentation to ensure links to API documentation point to the new provider's API documentation
- Change keys and certificates
- Adapt authentication processes to fit in with the new service
- Adjust development plans for their features to adapt to new APIs

Accommodating change and minimising the impact on the existing code stream may incur the use of feature flags to avoid splitting the code stream. In contrast, others may elect to break the code base, which incurs significant risk. Both options add to the complexity of their change process, adding to the cost of change. To implement the required changes, and depending on the engineering environment, a service user would need to use the following resources:

- Business analysis resource
- Product owner resource
- Development Resource
- Test Resource

The time needed to implement the changes will vary and depend on how well the service provider collaborates with service users. Some service users have advised RECCo that the time to implement and apply the changes could range from 15 to 60 days, though it will most likely take around 15 days.

As each service user will have to apply changes, and over 250 REC Parties and Third-Party Intermediaries use RECCo services, this will amount to a significant cost.

3.2 Impact with API Gateway in Place

In this scenario, a service is procured and replaces one behind the API Gateway; RECCo does not expect service users to undertake any additional changes. The reasons for this are as follows:

- The new service provider shall 'contract test' APIs based on existing API documentation, which shall conform to Open API standards and will have to ensure compatibility.
- RECCo shall also introduce an effective API Management Strategy that service providers must adhere to. This will ensure that a newly procured service shall provide the same functionality as the previous incumbent
- Service users shall not have to re-point the services to new endpoints. The API Gateway shall transfer requests from the external APIs to the new internal equivalent. The API Gateway's support team shall be responsible for configuring the routing of requests to the new API

As the new service provider must ensure backwards compatibility, any material difference detected in the responses provided is an issue for the new service provider to resolve, not for the service user to determine alternative processes to achieve the same functionality in their application(s). The change incurs no cost to the Service Users

3.3 Comparison

RECCo has engaged with consultants to review the potential cost of implementing an API Gateway. Their analysis suggests yearly costs would be less than £500,000/year. These are indicative and will not be known until the final tendering exercise.

It is evident from the two examples above that service users must invest more effort when a service is re-procured without an API Gateway in place than when it is. When the effort is considered for the service's entire user base, it is apparent that the cost of change can be far higher than the annual cost of maintaining and using an API Gateway.

3.4 Questions

6. Do you agree that implementing a RECCo API Gateway will save you time and effort?
7. Do our assumptions around the volumes of effort sound reasonable, or what alterations would you make?

4 Delivery and Management

RECCo has two core options for delivering and managing an API Gateway: an incremental or phased approach or a 'Big Bang' approach. The former would result in API Gateway functionality being delivered alongside services that need them, whereas a 'Big Bang' approach would result in all identified API Gateway functionality available when the API Gateway is first delivered. Regardless of approach, the API Gateway shall be introduced alongside a well-defined API Management strategy, which shall lead to:

- The provision of API documentation conforming to Open API standards
- The provision of a sandbox environment allowing developers and analysts to learn how to use APIs

- A collaborative approach to the design and implementation of APIs

Each approach is commented on below, alongside the risks each approach presents.

4.1 Incremental Approach

RECCo's incremental approach to delivering and managing an API Gateway would be a collaborative effort with service users to deliver functionality. Starting with a proof of concept, RECCo would work with Service Users to evolve the API Gateway, with the collaboration supporting additional activities, including:

Alpha/Beta testing: Delivery of what is needed when required. Not all services shall make the same demands on an API Gateway, so there is no real need to deliver all functionality until it is required, and collaboration and analysis of functionality and their impact as and when they are needed lead to more relevant and usable functionality being delivered.

4.2 Benefits of an Incremental Approach

There are several core benefits of this approach, which include:

- It de-risks having to rework functionality as the collaborative approach shall result in the identification of detailed requirements of the features in what way they are relevant to the industry, resulting in more appropriate and usable features being delivered and
- It reduces the 'time to market' as less must be developed and tested before an API Gateway is used in production.

4.3 Disadvantages of an Incremental Approach and Mitigations

The main disadvantage is that when new services integrate with the API Gateway, some additional configuration and development will have to be undertaken to accommodate new features being introduced. This is mitigated by better and more relevant functionality being delivered, but it must be emphasised that this will only be achieved through a collaborative effort.

4.4 A 'Big Bang' Approach

A 'Big Bang' approach includes all desired functionality when the service is first used.

4.5 Benefits of a 'Big Bang' Approach

The primary benefit is that once the API Gateway is in place, services will be able to integrate with it with no additional API Gateway features having to be developed. This would result in reduced planning overheads when combined with the service and reduced risk of delay due to prolonged delivery of an API Gateway feature.

4.6 Disadvantages of a Big Bang Approach and Mitigations

A big bang approach leads to the risk of prolonged development and business analysis when it is not needed. It can also lead to the development and validation of functionality that has yet to be used, which incurs unnecessary costs. In addition to this:

- Over time, the requirements of a feature can change. This, in turn, can lead to the original feature delivered not being relevant and requiring re-work;
- The feature is never used;

- Ideally, RECCo should work collaboratively. However, those they collaborate with may only have limited resources to do this. If a big bang approach was used, there may be less willingness to work collaboratively as it takes their resources away from delivering their key business objectives. It will make working collaboratively much more difficult.

The best mitigation against this is only to deliver functionality when needed. Given this mitigation, it seems intuitive to conclude that RECCo would benefit from adopting an incremental approach to providing an API Gateway as it has fewer risks.

4.7 Questions

8. Do you agree that an incremental approach is correct for bringing an API Gateway online?
9. Do you agree with the additional supporting aspects to make this operationally successful, and what would you like to see in place to make the collaborative approach work?
10. Can we contact you to engage in any prototyping alpha/beta work?

5 Consultation response sheet

You can also provide this feedback via our interactive online form – [click here](#).

Name	
Company	
Email address	
Telephone number	
Response confidentiality	

5.1 Questions

1. Do you agree with the proposal to introduce a RECCo API Gateway?

2. Do you agree with the strategic benefits outlined?

3. Have we identified all the risks?

4. Do you agree with the mitigations?

5. Does RECCo need to undertake other activities to:
- maximise the benefits described
- minimise the risks?

6. Do you agree that implementing a RECCo API Gateway will save you time and effort?

7. Do our assumptions around the volumes of effort sound reasonable, or what alterations would you make?

8. Do you think an incremental approach is best for bringing an API Gateway online?

9. Do you agree with the additional supporting aspects to make this operationally successful, and what would you like to see in place to make the collaborative approach work?

10. Can we approach you to engage with any prototyping alpha/beta work?