ORACLE NetSuite OpenAir

Business Intelligence Connector

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Business Intelligence Connector Overview

The Business Intelligence (BI) Connector feature gives you point and click access to your OpenAir list and report data from BI tools and other reporting, workflow and integration applications.

The BI Connector feature lets you:

- Publish lists and reports as resources accessible from tools outside of OpenAir. Each list and report published using the BI Connector feature acts as a custom query against the source data. You can refresh data on-demand in your BI tools to get the latest information available from published resources in the BI Connector.
  - Published list data is updated in real time.
  - Published report data gives a snapshot of your OpenAir data at the time of publication. You can set up OpenAir to refresh published reports automatically up to two times daily.
- Access your published list and report data from a data feed in an OData V4/JSON format, which is a standard format that can be consumed by BI tools such as Microsoft Excel, Microsoft Power BI, Tableau and many other applications. This format lets you connect your preferred tools to your published resource data without the need to write any code.
- Access you published list and report data from form scripts and scheduled scripts in OpenAir.
- Use the OpenAir NetSuite integration to export published report data to NetSuite.
- Access your published report data using calls to the `/published-reports/` REST API endpoint.

The following help topics give an overview of the BI Connector feature:

- Functionality —BI Connector Functionality
- Benefits — Benefits of BI Connector
- Getting Started — Getting Started with the BI Connector Feature
- Technology — You can connect to your published resource data using the following technology:
  - OpenAir OData Service (List and report data)
  - REST API (Report data only)
- Access Control — BI Connector Role Permissions and Data Access Privileges
- Requirements and Limits — BI Connector Requirements and Limits

The following help topics provide detailed procedures for:

- Publishing Reports
- Publishing Lists
- Connecting BI Tools to Your OData Feed
- Business Intelligence Connector Advanced Functions

Note: The Business Intelligence Connector feature is a licensed add-on. To enable this feature, contact your OpenAir account manager.

BI Connector Functionality

The Business Intelligence (BI) Connector feature lets you:

- **Publish lists** — You can publish lists using any of your list layouts and make each published list available to you only or to all authorized employees. Published list data is updated in real-time. The information available from a published list in the BI connector feature is the same as the information you see when accessing the list in OpenAir at all time. See Publishing Lists.

Note: The BI Connector feature supports all major lists from the Expenses, Invoices, Projects, Purchases, Resources, Timesheets and Workspaces applications. The following lists are currently supported:

- **Expenses** — Expense reports, Authorizations, Alerts.
- **Invoices** — Invoices, Charges.
- **Projects** — Bookings, Projects, Tasks, Issues, Billing Rules, Billing Transactions, Recognition Rules, Recognition Transactions, Alerts.
- **Purchases** — Purchase requests, Purchase Orders, Fulfillment, Fulfillments.
- **Resources** — Resources, Bookings, Alerts.
- **Timesheets** — Timesheets, Time entries, Time off requests, Leave accrual, Alerts.
- **Workspaces** — Workspaces, Discussions, Documents, Alerts.
- **Administration –Global Settings** — Contacts, Customers, Job codes.

- **Publish reports** — From the Reports application in OpenAir, you can publish your saved reports and give others access to your published reports. You can refresh your published reports manually or you can schedule automatic refreshes of your published reports on a daily, weekly or monthly basis. See Publishing Reports.
- **Connect your BI tools to your OData feed** — You can connect any BI tools or other applications supporting OData V4/JSON to published lists and reports in your OpenAir OData feed. You can then use these BI tools to analyze, visualize and report on your OpenAir data. Depending on your BI tools, you can schedule automatic refreshes to get the latest data from your OData feed and ensure that your dashboards and reports are always up-to-date. See Connecting BI Tools to Your OData Feed.
- **Read published report data or read up-to-date list data in your form and scheduled scripts** — You can use four OpenAir user scripting functions to read your published list and report data. These functions give you access to the same information available when you use BI tools to access your OData feed. See Reading Published Resource Data in Form and Scheduled Scripts in OpenAir.
- **Export published report data to NetSuite** — You can use OpenAir NetSuite Connector to export your published report data from OpenAir to custom records in NetSuite. After you export your published report data to NetSuite, you can create reports and dashboards in NetSuite to gain visibility into KPIs such as profitability and revenue forecast, combining NetSuite and OpenAir data. See Exporting OpenAir Published Report Data to NetSuite.
- (For developers) **ReadOpenAir published resource data in your applications** — You can read published report data using OpenAir REST API. You can also use an HTTP request to read published list and report data from the OpenAir OData service. See Reading Published Reports Data Using OpenAir REST API and Consuming OpenAir OData Resource Data in Your Applications.

Benefits of BI Connector

The Business Intelligence (BI) Connector feature lets you do more with your OpenAir data. It extends the reporting capabilities of OpenAir and lets you access your OpenAir data easily from other applications,

including most BI tools. You can then combine OpenAir data with information from other systems in your existing BI tools to create sophisticated reports.

The BI Connector feature has the following advantages over other methods you can use to work with your OpenAir data in your preferred BI tools:

- **Automation** — Schedule your reports to run and update your published report data at regular interval. Your published list data is updated in real-time. Depending on your BI tools, you can schedule automatic refreshes to get the latest published resource data and ensure that your dashboards and reports are always up-to-date. The BI Connector feature cuts out the need to export your report or list data as CSV files and import the data in other systems over and over again.
- **Security** — The BI Connector feature follows the same security best practice as OpenAir. All data is encrypted in transport using the industry standard transport layer security (TLS) protocol. Your published list and report data is stored securely on OpenAir servers. You can remove published resources at any time. You must enter your OpenAir sign-in details to access published resources. You can only access published resources if the BI Connector feature is enabled for your account and if you have the relevant role permissions. Data access through the BI Connector feature follows the same privileges and restrictions as in OpenAir. Account administrators can control access to the BI Connector functionality by role permission.
- **Portability** — Publishing and accessing data to and from the BI Connector preserves the original data types, whereas data exported as a CSV file is saved as text, even if the values were numbers in OpenAir.
- **Simplicity** — Connect BI tools to your published resource data without the need to write any code. Most modern BI tools can connect to external data sources and use wizards to guide you through the data connection. Follow the vendor documentation for the product you want to connect to your published OpenAir resources. Little maintenance effort is required, if any, after your tools are connected to the published OpenAir resources.

The BI Connector feature also extends the capability of the User Scripting feature in OpenAir by letting you access your list and report data in form and scheduled scripts. You can use published lists like custom queries — this makes a sophisticated level of search and sorting available before you start processing the data in your scripts.

Getting Started with the BI Connector Feature

The following steps give an overview of the typical workflow working with the Business Intelligence (BI) Connector feature:

- To publish resources and make them accessible from BI tools.
- To consume published resources from your BI tools, or in your form and scheduled scripts in OpenAir.

1. Working with reports:
    a. **Create and save a report** in the Reports application. Include all the data you want to have access to from your BI tools.

    > **Note:** If the report has collapsible levels — for example, a Customer column under which different projects roll up under — the published report data will not include the data for the sub-categories (for example, projects) if the parent level (for example, the customer) is collapsed. In the report, click **show all** to include all sub-categories in the published data, and **hide all** to exclude all sub-categories and only include the totals for the main level.

    b. [Optional] **Share the report** with other employees in your company.

c. **Publish the report** — See Publishing Your Reports Manually

d. [Optional] **Share the published report** — Choose whether you want the other employees you shared the report with to have access to the published report. See Sharing Published Reports With Other Employees in Your Company.

e. **Refresh the published report automatically** — Schedule the report to be published every day, week or month if you want to refresh your published report data regularly and automatically. See Configuring OpenAir to Publish Reports Automatically and Refresh Published Reports Periodically.

2. Working with lists:

a. **Personalize your list** — Go to a supported list in OpenAir, select list columns, change the sort order, apply column filters and save your list layout. You can use published lists like custom queries and refine the data that you want to access from your BI tools, or in your form and scheduled scripts.

b. **Publish your list as private or public** — Edit the list layout properties and publish the list. Choose whether you want other employees in your company to have access to the published list. Published list data is updated in real-time. See Publishing Lists.

3. Working with your OpenAir data in your BI tools:

a. **Connect to your published resources data** — In your BI tools, connect your BI document to published resources (reports or lists) data. See Connecting BI Tools to Your OData Feed.

b. **Shape and transform your imported data** — Some tools let you transform the imported data before it is displayed in the BI tool itself. You can rename or re-order your columns, for example or sort and refine the data to suit your purpose.

c. **Refresh the data automatically** — Schedule automatic data refreshes in your BI tools to get the latest published resource data as often as needed. Most BI tools offer the option to refresh the data every time you open the document and at regular interval while you work with your data.

d. **Build your dashboards and reports** — Use the full capability of your BI tools to build and distribute your dashboards and reports.

Important: The number of requests you can send to the BI Connector feature is limited. To review your usage and the limits set for your account, go to Administration > Global Settings > Account > BI Connector limits. For more information, see BI Connector Requirements and Limits

Note: Remember the difference between the different type of resources:

- Published lists give you access to your OpenAir data in real-time.
- Published reports are a snapshot of your OpenAir data at the time of publication. It is equivalent to running a report and exporting the report to a CSV file.

4. Working with your published list and report data in your form and scheduled scripts. See Reading Published Resource Data in Form and Scheduled Scripts in OpenAir.

Note: Accessing published resource data using user scripting functions does not use any of your allocated BI Connector requests.

OpenAir OData Service

The Business Intelligence (BI) Connector feature uses the OData standard to make your published OpenAir resources available as a data source which you can import into BI tools applications supporting OData v4/JSON.

The Open Data Protocol (OData) is an ISO/IEC approved and widely supported standard which allows the exchange of data between applications. Most BI tools, including Microsoft Excel, support OData either natively or with the aid of a plug-in.

Note: OASIS Open Data Protocol (OData) TC gives the following overview:

The OASIS OData TC works to simplify the querying and sharing of data across disparate applications and multiple stakeholders for re-use in the enterprise, Cloud, and mobile devices. A REST-based protocol, OData builds on HTTP, AtomPub, and JSON using URIs to address and access data feed resources. It enables information to be accessed from a variety of sources including (but not limited to) relational databases, file systems, content management systems, and traditional Web sites. OData provides a way to break down data silos and increase the shared value of data by creating an ecosystem in which data consumers can interoperate with data producers in a way that is far more powerful than currently possible, enabling more applications to make sense of a broader set of data. Every producer and consumer of data that participates in this ecosystem increases its overall value.

For more information about OData, see the OData website.

OpenAir OData service or OData service designates the software technology supporting the BI Connector functionality. It works as a repository for published OpenAir resources and as the connection point which can be used to load OpenAir data into compatible applications.

OpenAir OData feed or OData feed designates the particular collection of published resources you have access to in the OpenAir OData service. For information about connecting to your OData feed, see Your OData Feed URL and Connection Details.

You can use your OData feed URL and connection details to:

- Connect to your OData feed resource from your BI tools or other compatible applications — see Connecting BI Tools to Your OData Feed.
- View OData feed resource data directly in your web browser. The browser displays your resource data as a JSON object — see Viewing Your OData Resource Data in a Web Browser.
- (For developers) Request OData feed resource data in your applications using the HTTP GET method. The OData service returns the response as a JSON object — see Consuming OpenAir OData Resource Data in Your Applications.

BI Connector Role Permissions and Data Access Privileges

Role Permissions

You must be an account administrator or have the relevant role permissions to publish resources.

To access published resource data from, or connect your BI tools to your OpenAir OData feed, you must enter your OpenAir sign-in details. You cannot access the OData service if you sign in to OpenAir using SAML single sign-on.

To access published report data using OpenAir REST API, you need to authorize the client application to access OpenAir on your behalf. The authorization process requires you to sign in using either your OpenAir sign-in details or SAML single sign-on. For more information, see the help topic Authorizing Applications to Access OpenAir on Your Behalf.

You can only access the lists and reports you published, the published reports others shared with you, and the lists published by others as public resources.

Account administrators control who can publish lists and reports with the following role permissions:

- **Publish reports**
- **Enable publishing of shared reports to BI Connector with recipient's permission**
- **Enable publishing of shared reports to BI Connector with owner's permissions**
- **Publish List View via BI Connector**

The **Publish reports** role permission lets you:

- Publish the reports you own (reports listed in Reports > Saved reports > My reports).
- Publish the reports others have shared with you and published.
- Access published reports data (published reports you own and published reports others have shared with you).

The **Enable publishing of shared reports to BI Connector with recipient's permission** and **Enable publishing of shared reports to BI Connector with owner's permissions** role permission let you publish the reports you have shared with others in the Reports application, share the published reports with them and:

- Restrict the data they can see when accessing the published report according to their data access privileges in OpenAir (Share with recipient's permission).
- Allow them to see the same data you can see even if they do not have access to that data in OpenAir (Share with owner's permission).

The **Publish List View via BI Connector** role permission lets you publish lists with the following options:

- Publish as private — Only you can access the published list.
- Publish as public — All employees in your OpenAir account with the relevant data access privileges can access the published list.

Data Access Privileges

The information you can see when accessing published resource data or importing it into your BI tools is the same information you can see if you access the resource in OpenAir. The BI Connector feature respects your active filter set in OpenAir. Filter sets define what data you have permission to view in OpenAir and they are assigned by your account administrators.

A report owner may share a published report with you and give you permission to see the same data they see for that particular report. For more information, see Data Access Privilege Schemes for Published Reports.

BI Connector Requirements and Limits

Requirements

- The BI tools and other applications must support OData v4/JSON or REST API calls to connect to your published resource data.
- You must have access to the Reports application to create and publish reports.
- The **Save list layout** feature must be enabled for your account to publish lists.
- You must use a **secure URL scheme** (`https://`) to access your published resource data from a BI tool, web browser or any other application. OpenAir uses the industry standard Transport Layer Security (TLS) protocol to encrypt communication between the OpenAir server and the client application, and to ensure the security of the data transferred. Attempting to connect to your published resource data using a URL scheme that is not secure (`http://`) will return an error (Unable to connect).

BI Connector Limits

- Access to published resource data is **read-only**.
- The published report automatic refresh schedule uses the report scheduler in the Reports application. The frequency of refreshes follows similar limitations as scheduled report runs. The BI Connector feature lets you schedule an additional published report data refresh on the same day. You can refresh published report data manually at any time.
- The OpenAir OData service does not support authentication using SAML single sign-on. Users must sign in using their OpenAir company ID, user ID and password to access publish resource data in their OpenAir OData feed.

  Users can authenticate using either their OpenAir sign-in details or SAML single sign-on to access publish resource data using the REST API, if API access is enabled for your company's OpenAir account.
- Reading published resource data is subject to request limits — see BI Connector Requirements and Limits.
- The OpenAir OData service only supports the HTTP `GET` method — see Consuming OpenAir OData Resource Data in Your Applications.
- The OpenAir OData service only supports the `$top` and `$skip` query parameters — See OData Query Options for more details.

BI Connector Request Limits

Reading published resource data is subject to the following frequency limits for each account.

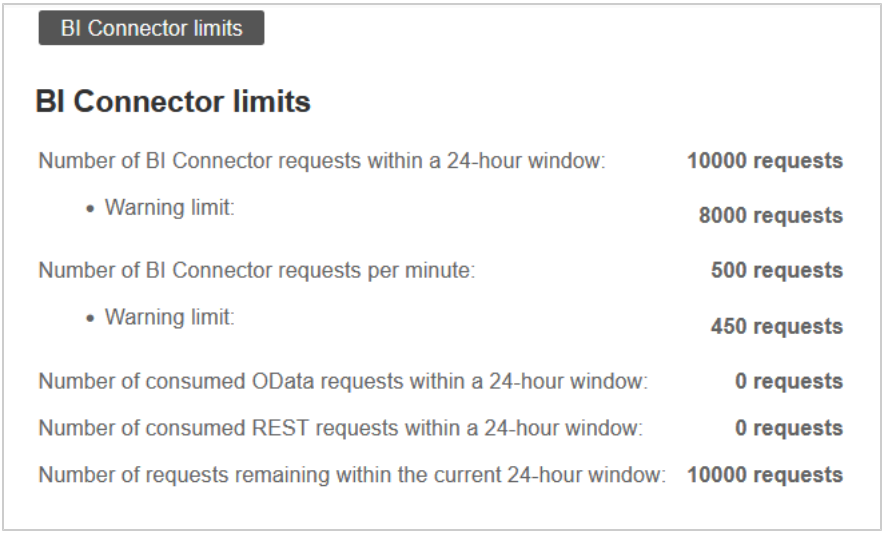
Limit Type	Default Limit
Number of BI Connector requests within a 24–hour window	10,000 requests (a maximum of 10,000,000 rows of data) OpenAir issues a warning if you reach 8,000 requests
Number of BI Connector requests per minute	500 requests (a maximum of 500,000 rows of data)

Limit Type	Default Limit
	OpenAir issues a warning if you reach 450 requests

- The BI Connector frequency limits apply to the **number of read requests**. Publishing resources does not count toward your BI Connector request limits.
- Each access to any one published resource uses **at least one request**. Every time you load data from a published resource into your BI tool or in a wizard preview page and every time you refresh the data counts as at least one request.
- **Each request is limited to 1,000 rows of data**. Accessing a published resource with anything between 1 and 1,000 rows of data uses one request. Accessing a published resource with more than 1,000 rows of data uses 1 request for each 1,000 rows or part therein — for example, accessing a published resource with 4,001 rows of data would use 5 requests.

> **Note:** If you load published resources containing a high number of rows into your BI tool, your BI tool should send automatically as many requests as necessary, if allowed by your frequency limits, and retrieve all the data seamlessly from the resource in your OData feed. Most applications supporting OData v4/ JSON should support combined requests.
>
> Application developers can process the response from the OData service or the REST API and page through large published resources. See Business Intelligence Connector Advanced Functions.

- The BI Connector request limits are independent of any other data limits.
- Accessing published resource data using `NSOA.listview` and `NSOA.report` user scripting functions does not use any of your BI Connector request entitlement. It is only subject to scripting governance limits. See the help topic Scripting Governance.
- OpenAir sends a warning email to the account administrator if a warning has been issued during the day (one warning email per day).
- Administrators and users with the **View BI Connector limits** role permission can view BI Connector limits and usage for your company's OpenAir account on the BI Connector limits (Administration > Global Settings > Account > BI Connector limits). The BI Connector limits page shows the maximum number of requests allowed for your account as well as the number of requests remaining in the current 24-hour window. It also breaks down the number of requests consumed using the OData service and the REST API in the current 24-hour window.



Tip: To ensure you stay within the BI Connector requests limits for your account:

- **Disable previews in your BI tools**. BI tools send a request to display a preview for each resource.
- **Refresh your data sparingly in your BI tools**. Every data refresh uses as many requests as necessary to import all rows of data for each connected published resource being refreshed. Most BI tools let you configure refresh settings and have options to refresh all data connections or only one data connection at a time.
- **Only import the data you need**. Refine the configuration of the lists and reports you want to publish to import only the data you need to access from your BI tools. Filter your data in OpenAir and not in your BI tools or your applications to minimize the number of requests used with each import or refresh.

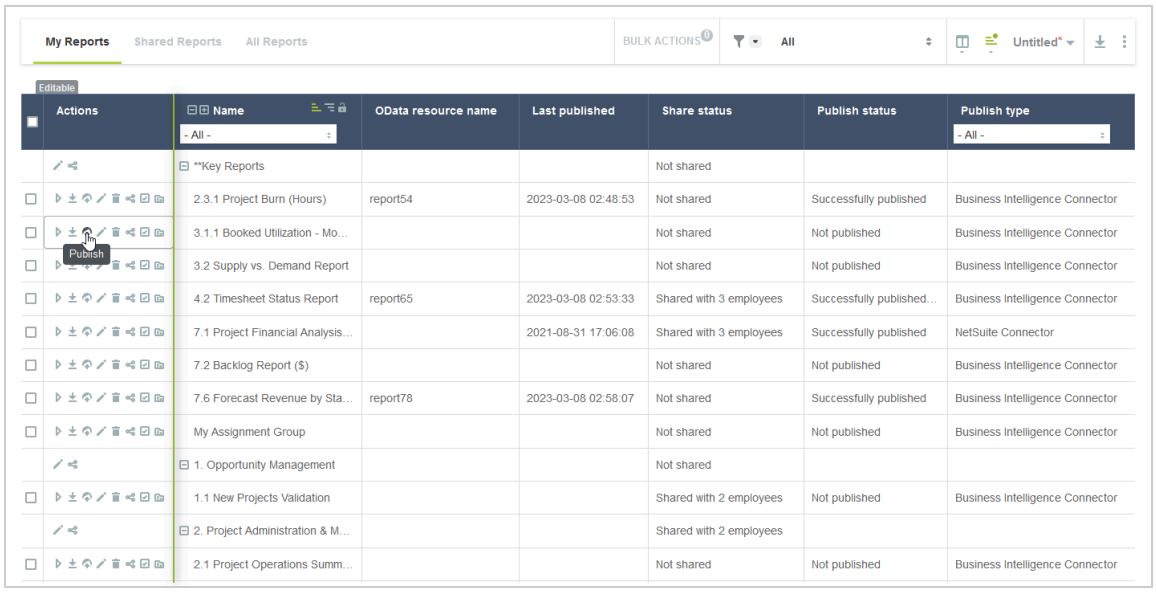
Note: To adjust the BI Connector limits set for your account, contact your OpenAir account manager.

Publishing Reports

The Business Intelligence (BI) Connector feature lets you publish reports and make the report data available for import into any BI tools supporting OData V4 or REST API calls, for import into NetSuite using OpenAir NetSuite Connector, or for use within your form and scheduled scripts in OpenAir. You can specify a scope of use for the reports your publish. See Published Report Scope of Use.

You can publish reports and manage your published reports from within the Reports application in OpenAir by going to Reports > Saved reports. From there, you can:

- Publish reports — See Publishing Your Reports Manually.
- Configure OpenAir to publish reports and refresh published report data automatically according to a schedule — See Configuring OpenAir to Publish Reports Automatically and Refresh Published Reports Periodically.
- Share your published reports with other employees in your company — See Sharing Published Reports With Other Employees in Your Company.
- Publish reports others have shared with you and published with recipient's permission — See Publishing Reports Others Have Shared with You.
- View the publication status and the resource name for your reports — See Verifying the Publication Status of your Reports.
- Remove a report from your published reports — See Deleting Published Reports from the BI Connector.



Tip: To see all the information you need straight from the Saved reports list, add the following columns to your list: **OData resource name**, **Publish status**, **Last published** and **Shared status**. You can save this list layout for later use.

Published Report Scope of Use

When publishing a report manually or configuring OpenAir to publish or refresh a report automatically according to a schedule, you can choose a scope of use. The following options are available.

- **Business Intelligence Connector** – The published report data is available to be consumed by any business intelligence (BI) tools or other applications connecting to your OData feed or connecting to your published report data using the `/published-reports/` REST API endpoint. The published report data is also available from your form and scheduled scripts in OpenAir. See Connecting BI Tools to Your OData Feed and Consuming OpenAir OData Resource Data in Your Applications
- **NetSuite Connector** — The published report data is available for export to NetSuite using a custom export workflow. The published report data is also available from your form and scheduled scripts in OpenAir but it is not available from the OData service or the `/published-reports/` REST API endpoint. See Exporting OpenAir Published Report Data to NetSuite.

  Important: The following guidelines apply when publishing a report for export to NetSuite using OpenAir NetSuite Connector:

  - The owner of the report must be the same account administrator as the dedicated **Integration user** selected on the OpenAir NetSuite Connector Credentials tab.
  - The published report cannot be shared with others. Use the default **Do not share** permission setting. If you select a different permission setting, it will be reset automatically to **Do not share** when publishing the report.
  - The published report scope of use (**Publish type**) cannot be changed if the report was previously published for use with OpenAir NetSuite Connector and a custom integration workflow to export the published report data exists.
- **User Scripting** — The published report data is available only from your form and scheduled scripts in OpenAir. See Reading Published Resource Data in Form and Scheduled Scripts in OpenAir.

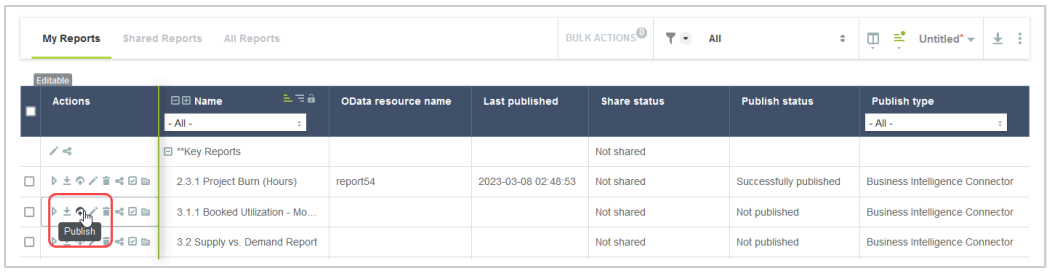
Publishing Your Reports Manually

You can publish your saved reports if the Business Intelligence (BI) Connector feature is enabled for your account and if you have the **Publish reports** role permission.

Note: Publishing a report manually is equivalent to running that report and exporting the report data as a CSV file. It take a snapshot of your data at the time of publication.

To publish a report:

1. Go to Reports > Saved reports > My reports. This list shows the reports you own.

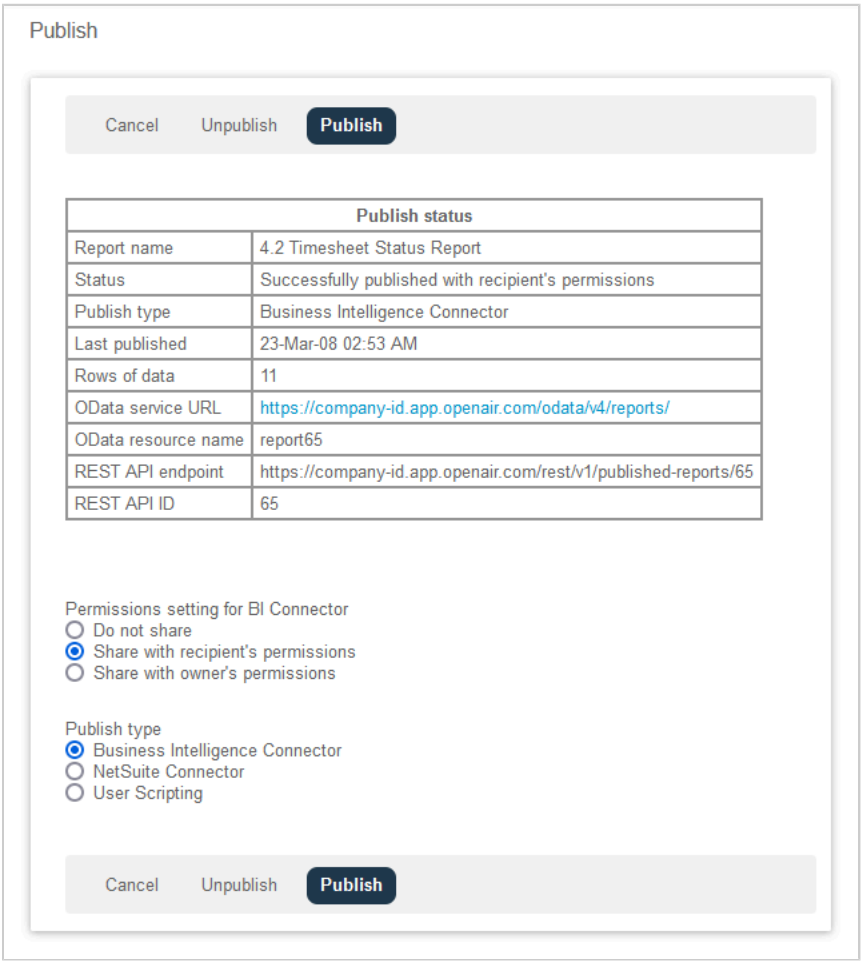


2. Click the publish icon in the **Action** column for the report you want to publish.

The Publish page appears.

Review the following guidelines:

- Review the current publication status of your report. Publishing the report will overwrite the last published version of the same report.
- The published report scope of use (**Publish type**) cannot be changed if the report was previously published for use with OpenAir NetSuite Connector and a custom integration workflow to export the published report data exists.
- **Last published** shows the date and time when the report publication completed and the published report data became available from the BI Connector.
- The **OData resource name** indicates the type of resource (`report` or `list`) and the internal ID for that resource. You will need the OData resource name to identify the report when connecting your BI tool to your OpenAir OData feed.
- The **REST API endpoint** that you can use to connect to your report API using the REST API.
- The **REST API ID** is the internal ID for the published resource. It is the same internal ID as the internal ID included in the OData resource name and as the `reportID` used as parameter to read publish report data using the `NSOA.report.data(reportId)` user scripting function.
- The OData resource name, REST API endpoint, and REST API ID are allocated by the BI Connector feature and cannot be changed. They are not available if the report was published for use with OpenAir NetSuite Connector.



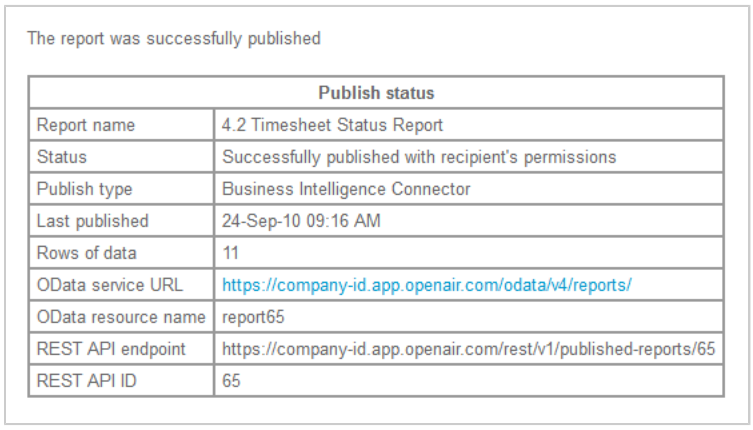
3. If your role permissions allow you to share your published reports with others, and if you are publishing a shared report, choose a **Permission setting for BI Connector**. The option you choose determines whether others have access to your published reports and what data they can see. For more information about sharing permissions, see Sharing Published Reports With Other Employees in Your Company.

   Important: The permission setting default to **Do not share** every time you publish a report. If you share the published report with others and want to continue to do so, you must select a permission setting every time you publish the report.

4. Choose a **Publish type**. The option you choose determines whether the published report data is available for use with connected BI tools, or for export to NetSuite using OpenAir NetSuite Connector, or exclusively for use with user scripting. See Published Report Scope of Use.

5. Click **Publish**.

   A confirmation message and the publication status information are displayed on the page. For guidelines regarding the information provided, see step 2.



The report was successfully published

Publish status	
Report name	4.2 Timesheet Status Report
Status	Successfully published with recipient's permissions
Publish type	Business Intelligence Connector
Last published	24-Sep-10 09:16 AM
Rows of data	11
OData service URL	https://company-id.app.openair.com/odata/v4/reports/
OData resource name	report65
REST API endpoint	https://company-id.app.openair.com/rest/v1/published-reports/65
REST API ID	65

Important: The following guidelines apply when publishing a report for export to NetSuite using OpenAir NetSuite Connector:

- The owner of the report must be the same account administrator as the dedicated **Integration user** selected on the OpenAir NetSuite Connector Credentials tab.
- The published report cannot be shared with others. Use the default **Do not share** permission setting. If you select a different permission setting, it will be reset automatically to **Do not share** when publishing the report.
- The published report scope of use (**Publish type**) cannot be changed if the report was previously published for use with OpenAir NetSuite Connector and a custom integration workflow to export the published report data exists.

Configuring OpenAir to Publish Reports Automatically and Refresh Published Reports Periodically

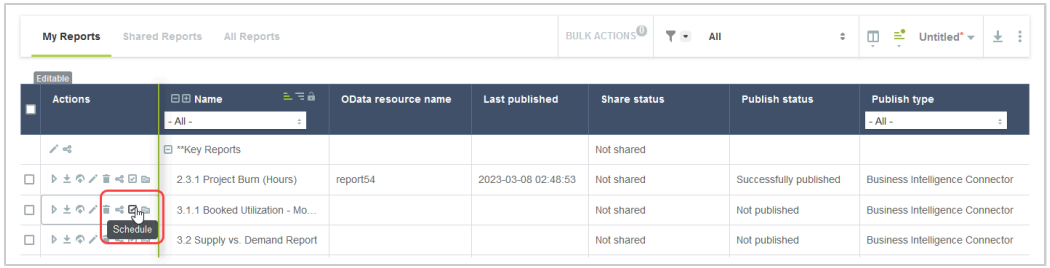
If the Business Intelligence (BI) Connector feature is enabled for your account and if you have the **Publish reports** role permission, you can use the Schedule feature in the Reports application to publish your reports automatically at regular intervals. Publishing your reports automatically on a daily, weekly or monthly basis will refresh the report data available from the BI Connector.

You can configure OpenAir to refresh each published report automatically twice on the same day, and specify the times for each refresh. This option is only available if the BI Connector feature is enabled for your account, and only for reports published to the BI Connector.

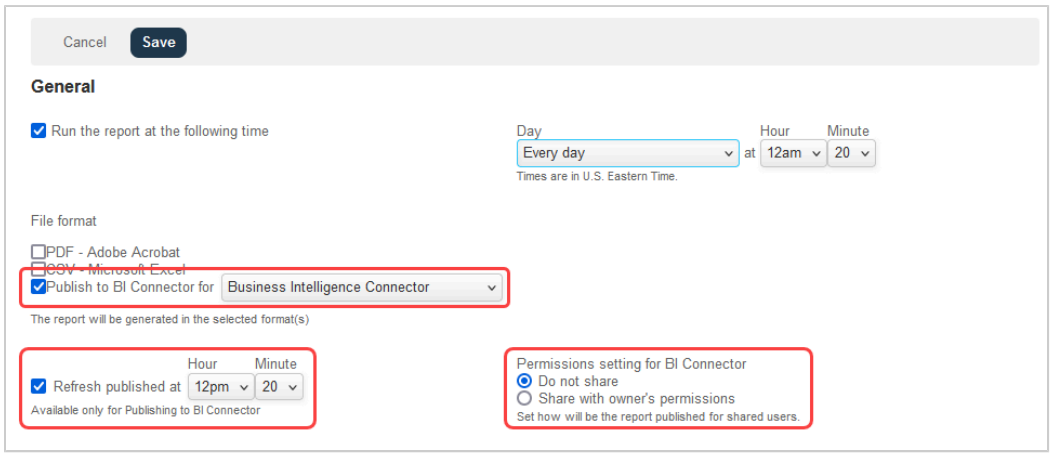
If your BI tools connect to the BI Connector and are configured to refresh automatically, the data you see in these tools will be refreshed according to the same schedule. For more information, see Connecting BI Tools to Your OData Feed.

To configure OpenAir to publish a report automatically and periodically to BI Connector:

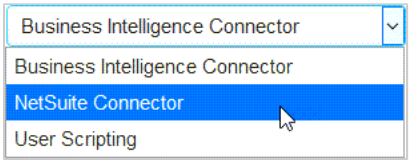
1. Go to Reports > Saved reports > My reports.



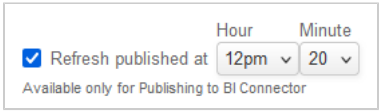
2. Click the schedule icon in the **Action** column for the report you want to publish. The Schedule report form appears.



3. In the General section of the Schedule Report form:
    a. Check the **Run the report at the following time** box.
    b. Select a **Day** and time to set the frequency of publication. The publication schedule can be set to run everyday, or on a specific day of the week or month.
    c. Check the **Publish to BI Connector** box and select the scope if use for the published report from the dropdown options. The option you select determines whether the published report data is available for use with connected BI tools, or for export to NetSuite using OpenAir NetSuite Connector, or exclusively for use with User Scripting. See Published Report Scope of Use.



    d. You can refresh published reports twice on the same day. To do so, check the **Refresh at** box and select a second publication time for your report.



    e. If your role permissions allow you to share your published reports with owner's permissions, and if you are publishing a shared report, choose a **Permission setting for BI Connector**. The option you choose determines whether others have access to your published report, and what data in you published report they have access to. For more information about sharing permissions, see Sharing Published Reports With Other Employees in Your Company.

> **Important:** When publishing a report for export to NetSuite using NetSuite Connector, the leading practice is to keep the default **Do not share** permission setting. The owner of the report must be the account administrator managing the NetSuite Connector configuration.

4. Click **Save**.

Sharing Published Reports With Other Employees in Your Company

The Reports application lets you share your reports with other employees in your company. With the Business Intelligence (BI) Connector feature, you can also publish the reports you shared with them and give these same employees access to your published report data. This functionality is available only if the **Publish Shared Reports using BI Connector** feature is enabled for your account and if you have the relevant role permissions.

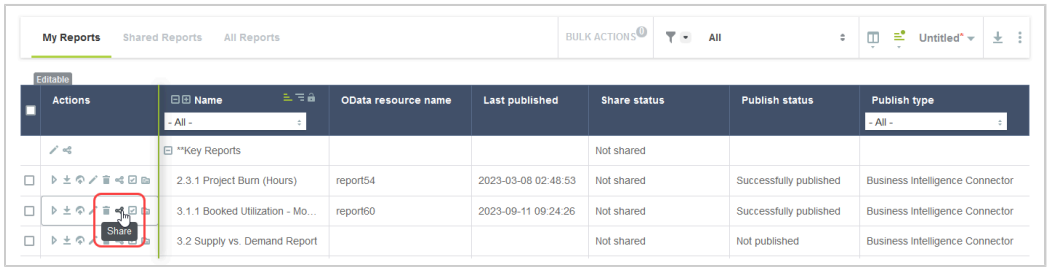
When you publish a report or configure a schedule to publish a report automatically, you can select a data access privilege scheme for your published report — see Data Access Privilege Schemes for Published Reports.

After you share a published report with others, you can manage who has access to your published report by editing the list of employees you share the report with— see Controlling Access to Your Shared Published Reports.

If you delete the report or remove the published report from the BI Connector, the employees you shared the report with will no longer have access to the published report data from connected tools — see Deleting Published Reports from the BI Connector.

To share a published report with other employees in your company:

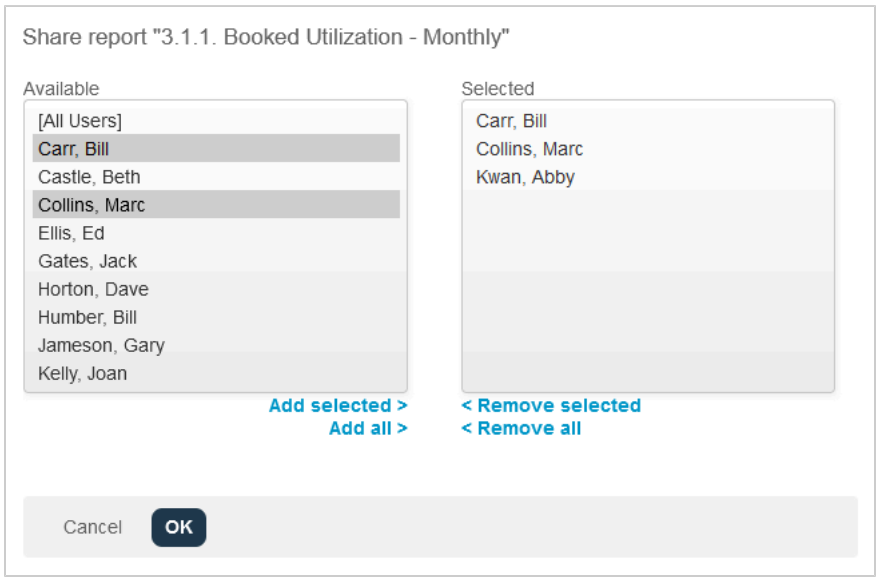
1. Go to Reports > Saved reports > My reports.



2. Click the share icon in the **Action** column corresponding to your report. The Share report dialog appears.

> **Note:** To give other employees access to published report data, you must first share the report with these same employees.

3. Add the employees you want to share the report with to the **Selected** column.



4. Click **OK** then click the **Click here** link to close the confirmation dialog and refresh the saved reports list.
5. Publish the report or schedule the report publication and select the appropriate data access privilege scheme for your published report. See Data Access Privilege Schemes for Published Reports.

   For more information about publishing reports, see Publishing Reports.

   For more information about scheduling report publication, see Configuring OpenAir to Publish Reports Automatically and Refresh Published Reports Periodically.

Data Access Privilege Schemes for Published Reports

There are three data access privilege schemes for published reports:

- **Do not share** — Only you can access your published report. This is the default option.
- **Share with recipient's permission** — The employees you shared the report with in the Reports application will be able to access the published report from the BI Connector after they publish the shared report. When they load the published report in a BI tool or view it in a browser, they will only see the data they have access to in OpenAir. This option is equivalent to each recipient saving and publishing a copy of the shared report.

  Note: This option is only available if you have the **Enable publishing of shared reports to BI Connector with recipient's permission** role permission.

  After you share a published report with recipient's permission, each recipient needs to publish this report before they can access the published report data from the BI Connector. Recipients must have the **Publish reports** role permission to publish the shared report for themselves and access the published report data from the BI Connector.
- **Share with owner's permission** — The employees you shared the report with in the Reports application can access the published report immediately from the BI Connector. When they load the published report in a BI tool or view it in a browser, they will see the same data you see, even if they do

not normally have access to that data in OpenAir. This option is equivalent to the owner exporting the report as a PDF document or CSV file and emailing it to the recipients.

Warning: Use this option with caution. You may give recipients access to data which they are not entitled to view. Remember that if your share a published report with owner's permission, the employees you shared the report with have access to the published report immediately from the BI Connector.

Note: This option is only available if you have the **Enable publishing of shared reports to BI Connector with owner's permissions** role permission.

After you share a published report with owner's permission, the employees you shared the published report will automatically have access to the published report data from the BI Connector. Recipients must have either the **Download reports** or the **Publish reports** role permission to access the published report data from the BI Connector.

Tip: To change the data access privileges for the employees you share the report with, publish the report again and select a different permission setting. This will also update the published report data.

Controlling Access to Your Shared Published Reports

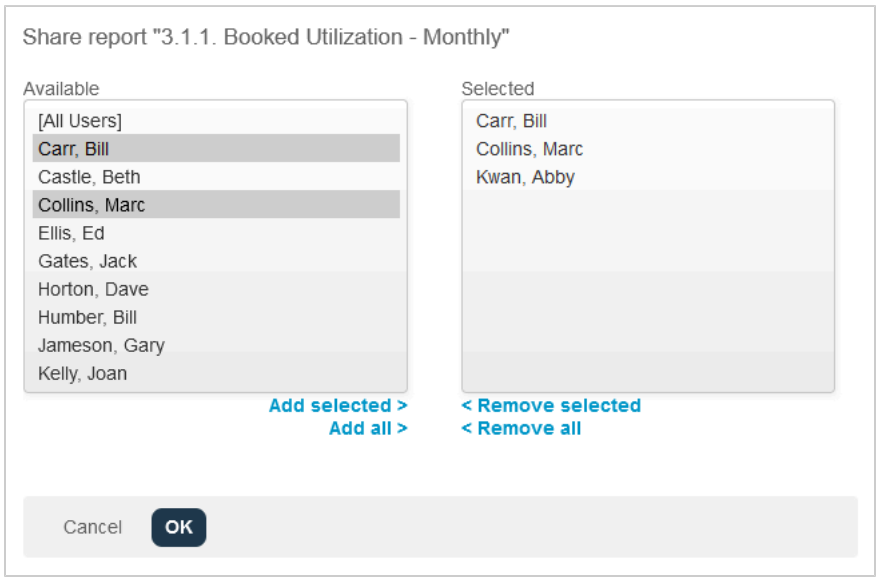
You can control who can access published shared reports from the BI Connector by controlling who can access the shared reports in OpenAir.

Tip: To stop sharing the published report altogether, publish the report again and select the **Do not Share** permission setting. This will update the published report data and change the data access privileges for the employees you share the report with.

Important: If you published a shared report with recipient's permission and a recipient published the shared report, they will still be able to access the published report from the BI Connector. However, they will no longer be able to publish the shared report and update the published report data.

To control access to your published reports from the BI Connector:

1. In OpenAir, go to Reports > Saved reports > My reports.
2. Click the share icon for your published shared report. The Share report dialog appears.
3. To give an employee access to your published report, add the employee to the Selected column. To remove an employee's access to your published report, remove the employee from the Selected column.



4. Click **OK** then click the **Click here** link to close the confirmation dialog and refresh the saved reports list.

Publishing Reports Others Have Shared with You

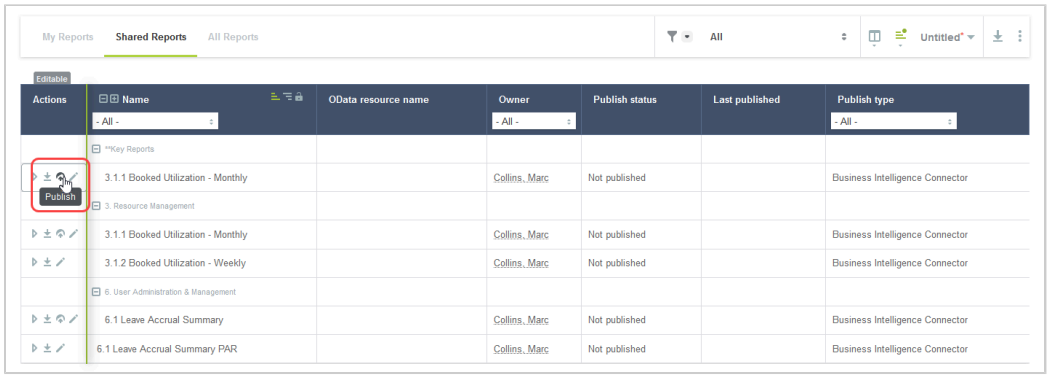
If other employees have shared a published report with you with recipient's permission, you must publish this report before you can access the published report data from the BI Connector.

Note: You must have the **Publish reports** role permission to publish the reports you own or the reports others have shared with you.

If the report owner deletes the report or removes the published report from the BI Connector, you will no longer be able to access the published report data from the BI Connector.

To publish a shared report:

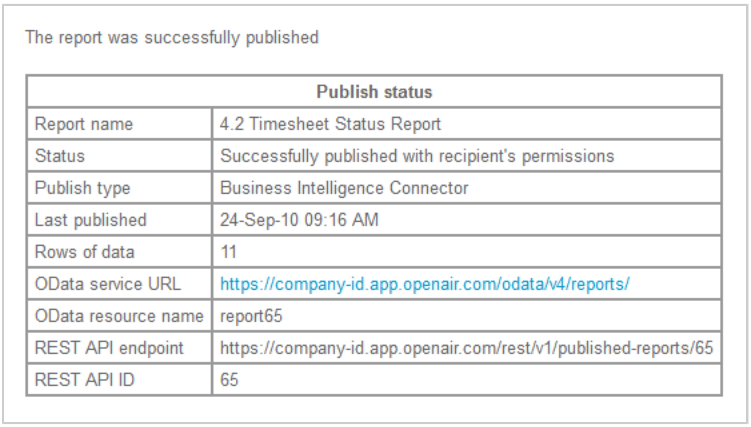
1. Go to Reports > Saved reports > Shared reports. This list shows the reports others have shared with you.



2. Click the publish icon in the **Action** column for the report you want to publish. The Publish page appears.

> **Note:** Review the current publication status of your report. Publishing the report will overwrite the last published version of the same report.

3. Click **Publish**. A confirmation message and the publication status information are displayed on the page.



The report was successfully published

Publish status	
Report name	4.2 Timesheet Status Report
Status	Successfully published with recipient's permissions
Publish type	Business Intelligence Connector
Last published	24-Sep-10 09:16 AM
Rows of data	11
OData service URL	https://company-id.app.openair.com/odata/v4/reports/
OData resource name	report65
REST API endpoint	https://company-id.app.openair.com/rest/v1/published-reports/65
REST API ID	65

Verifying the Publication Status of your Reports

You can view the publication status of your reports from the lists:

- To view the publication status of the reports you own, go to Reports > Saved reports > My reports
- To view the publication status of the reports others have shared with you, go to Reports > Saved reports > My reports

A summary of the publication status appears when you publish a resource. This lets you:

- Review the current publication status of your report. Publishing the report will overwrite the last published version of the same report.
- Get confirmation that you report was published successfully.

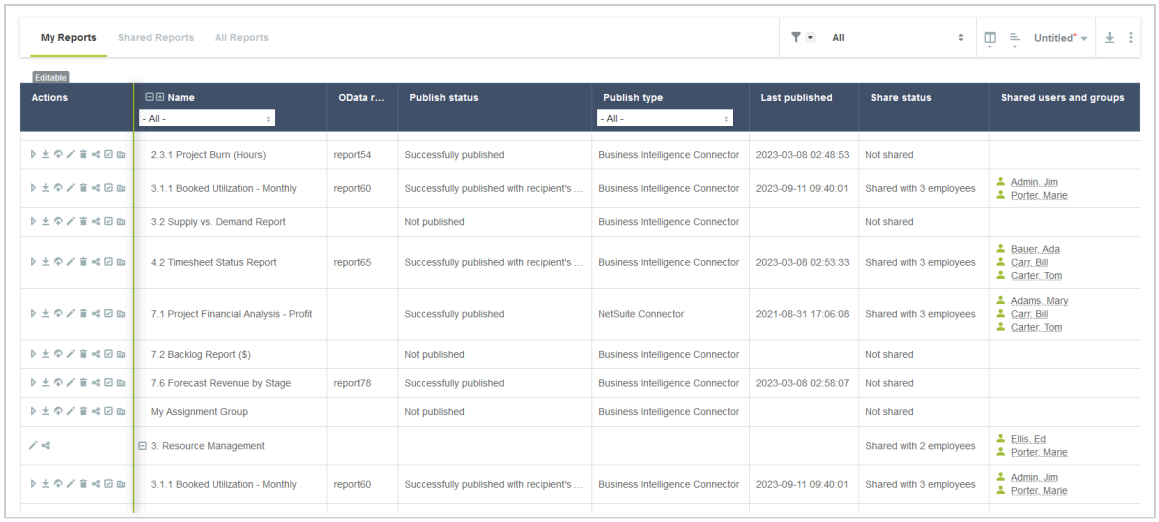
To see all the information you need straight from the Saved reports list at any time, add the following columns to your list and save the list layout for later use (if the feature is enabled for your account).

- **OData resource name** — Use the OData resource name to access the published report in your OpenAir OData feed.

  > **Note:** The **OData resource name** indicates the type of resource (`report` or `list`) and the internal ID for that resource. You will need the OData resource name to identify the report when connecting your BI tool to your OpenAir OData feed. The OData resource name is allocated by the Business Intelligence Connector feature and cannot be changed. It is not available if the report was published for use with OpenAir NetSuite Connector.

- **Share status** (only in Reports > Saved reports > My reports) — Shows whether you have shared this report and how many employees you have shared this report with.
- **Shared users** (only in Reports > Saved reports > My reports) —The employees you have shared the report with.
- **Publish status** — Shows whether you have published the report and what permissions you have shared it with, if applicable.

- **Publish type** — Shows the scope of use for your published report. See Published Report Scope of Use.
- **Last published** — The date and time when the last report publication or refresh completed and when the published report data became available from the BI Connector. The time stamp is updated whether the report was published manually or automatically (scheduled publication).
- **Owner** (only in Reports > Saved reports > Shared reports) — The name of the user who owns the report and shared it with you.



Deleting Published Reports from the BI Connector

There are two ways to delete published report data from the BI Connector:

- You can delete only the published report data.
- You can delete both your saved report and your published report data.

After you delete a published report, no one will be able to access the published report data from the BI Connector. Deleting a published report also deletes the published report data for the other employees you shared the published report with.

Note: Any published report data cached in your BI tool will still be available for use after you delete the report or the published report data. However, you will not be able to update this data.

To delete only the published report data:

1. Go to Reports > Saved reports > My reports or Reports > Saved reports > Shared reports.
2. Click the publish icon in the **Action** column for the report.
3. Click **Unpublish**.

Note: Reports published for use with OpenAir NetSuite Connector cannot be unpublished if a custom integration workflow to export the published report data exists.

To delete both your saved report and your published report data:

1. Go to Reports > Saved reports > My reports.
2. Click the Delete icon next to the report you want to delete. A confirmation dialog appears.
3. Click **OK**. Your report will no longer be available in OpenAir and the corresponding published report data will no longer be available from the BI Connector.

Publishing Lists

The Business Intelligence (BI) Connector feature lets you publish lists and make the list data available for import into any BI tools supporting OData V4/JSON or for use within your form and scheduled scripts in OpenAir.

Published list data is updated in real-time and available instantly to your connected BI tools. If your BI tools are configured to refresh automatically, the data you see in these tools will synchronize with the list data in OpenAir during every refresh. For more information, see Connecting BI Tools to Your OData Feed.

By default, your published lists are private — only you can access your published list data. You can make your published lists public, that is, available to all active employees in your company's OpenAir account. Employees accessing public published lists have access to the same data they normally have access to in OpenAir. Data access privileges are set by account administrators using filter sets and the same filter sets apply whether you view list data in the OpenAir UI or view published list data in a connected BI tool.

You can view and manage the list of available published lists. See Managing Published Lists.

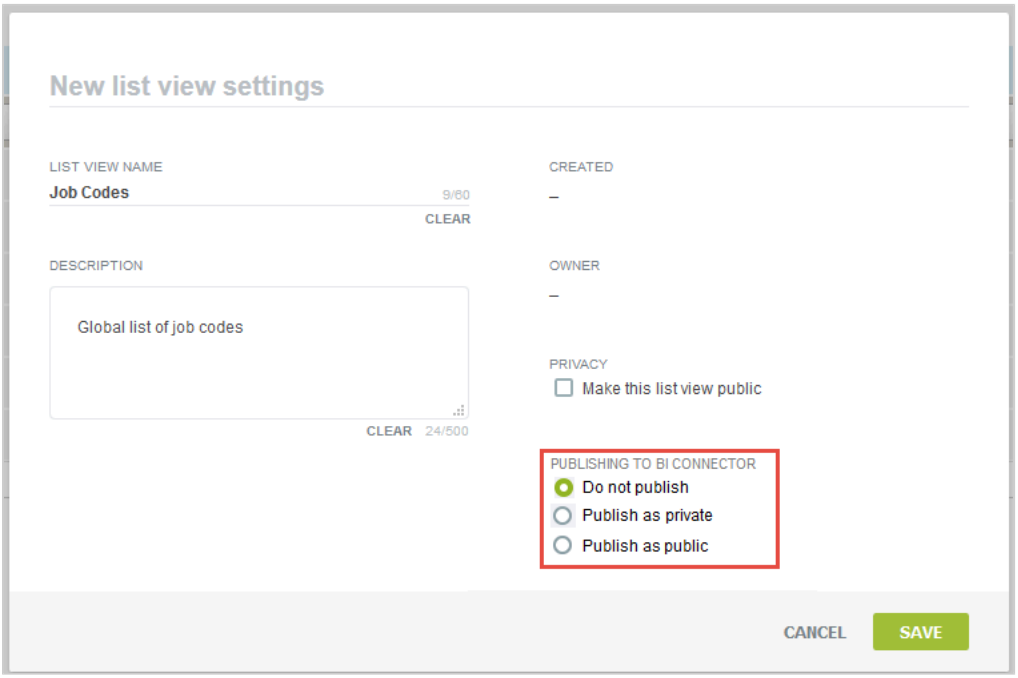
Note: The BI Connector feature supports all major lists from the Expenses, Invoices, Projects, Purchases, Resources, Timesheets and Workspaces applications. The following lists are currently supported:

- **Expenses** — Expense reports, Authorizations, Alerts
- **Invoices** — Invoices, Charges
- **Projects** — Bookings, Projects, Tasks, Issues, Alerts
- **Purchases** — Purchase requests, Purchase orders, Fulfillment, Fulfillments
- **Resources** — Resources, Bookings, Alerts
- **Timesheets** — Timesheets, Time entries, Time off requests, Leave accrual, Alerts
- **Workspaces** — Workspaces, Discussions, Documents, Alerts
- **Administration** – **Global Settings** — Contacts, Customers, Job codes

To publish a list:

1. Go to the list you want to publish.
2. Select one of your list layouts or create a new one based on the active configuration. For more information about list layouts, see Administrator Guide.
3. Click **Edit properties** in the List Layouts panel, or click **Save as ...** if you are creating a new list layout.
4. In the Edit list view settings (or New list view settings) form, select one of the available options under **Publishing to BI Connector**:
   - **Do not publish** — the list will not be published (this is the default setting).
   - **Publish as private** — the list will be published, but only the user publishing it can access the data.

- **Publish as public** — the list will be published and available for any user to access. This option respects role permissions and rules for data access, so users can only see data which their role allows them to see.



5. Click **Save**.
6. You can connect your BI tools to your published list data and work with your list data from your BI tools. See Connecting BI Tools to Your OData Feed.

Managing Published Lists

You can view and manage the published lists available for consumption. Administrators and users with the **View and modify all saved list views** role permission can view and manage all published lists on the account from the Administration module.

When the BI Connector feature is enabled for your account, the Manage list view settings page shows the following columns:

- **Publish status** — Shows whether the list is published as a private resource (available to the list layout owner only), as a public resource (available to all users), or not at all.
- **Last published** — The date and time when the list layout was last saved.
- **OData resource name** — Use the OData resource name to access the published list in your OData feed.

Other list layout properties provide additional details about the published list including **Owner** which shows the name of the employee who published the list.

You can delete a list layout. After you delete a list layout, the published list associated with that list layout is no longer available.

To manage the lists you published:

1. Go to the list.
2. Click **Manage saved list views** from the List Layouts panel. The "Manage list view settings" popup displays the list of configurations you saved for this list.

   To delete a list layout and the associated published list, click the delete icon in the Actions column.

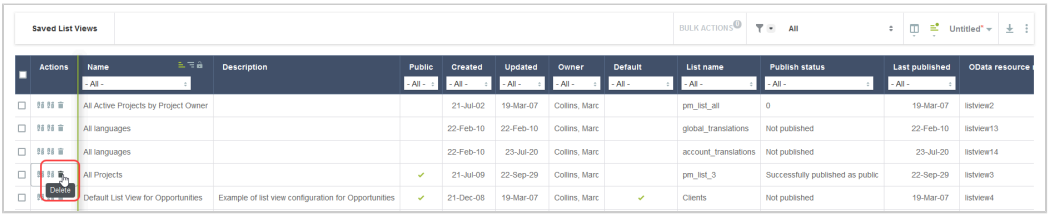
> **Note:** If you have no saved configurations for this list, the **Manage saved list views** option is disabled.

To manage all published lists on the account:

1. Go to Administration > Global Settings > Organization > Saved List Views.

   The Manage list view settings page appears. It lists all the lists published by all users across your OpenAir account.

   To delete a list layout and the associated published list, click the delete icon in the Actions column.



Connecting BI Tools to Your OData Feed

You can connect any business intelligence (BI) tool or any other application supporting OData v4/JSON to your OData feed. After you connect your application to the OData feed, you will have access to the list or report data that you published or that others shared with you.

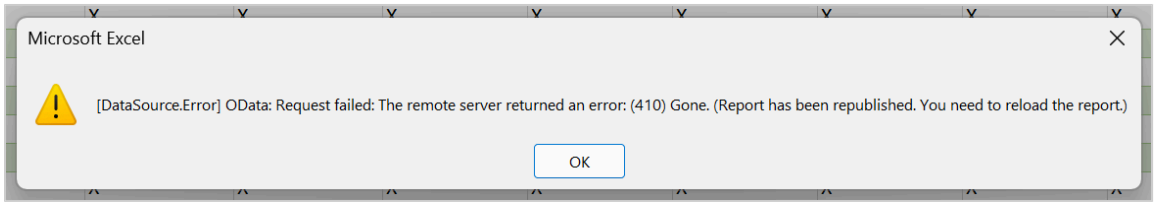
Note: You must have either the **Download Reports** or the **Publish Reports** role permission to access published reports in the OpenAir OData service. Accessing public published lists from the OData service does not require specific role permissions.

Many applications support OData v4. Check the vendor documentation for specific information about connecting your BI product to an OData feed. This section describes how to connect the following applications to your OData feed:

- **Microsoft Excel** — see Importing Data from Your OData Feed to Microsoft Excel.
- **Microsoft Power BI** — see Importing Data from Your OData Feed to Microsoft Power BI Desktop.

You will need to provide the URL for your OData feed as well as your sign-in information. See Your OData Feed URL and Connection Details.

If a published report is refreshed while your BI tool is reading or paging through that published report, the OData feed returns a `410 Gone` HTTP status error with the message "`Report has been republished. You need to reload the report.`". Whether and how the message is displayed depends on the BI tool you use to consume the published report data.



For information about specifications that your BI tool must meet to use the Business Intelligence (BI) Connector feature, see Requirements.

Your OData Feed URL and Connection Details

To connect a BI tool or any other application to your OpenAir OData feed, you will need the following details:

- **The location of the resource collection or the resource** you want to access in your OData feed. The URL contains the domain for your OpenAir account followed by the path to the OData resource or resource collection. The resource collection is either all your published reports or all your published lists. A resource is a specific published report or published list. To form the URL for a specific resource, add the resource name `<resource-name>` — for example `report53` or `listview64` at the end of the URL for the resource collection.

  Important: Some BI product do not support links to OData resource collections. For example, to import your published report data into Tableau, you must use the URL for a specific resource.

URL for your OData report collection	`https://<account-domain>/odata/v4/reports/`

URL for a specific OData report	`https://<account-domain>/odata/v4/reports/<resource-name>`
URL for your OData list collection	`https://<account-domain>/odata/v4/listviews/`
URL for a specific OData list	`https://<account-domain>/odata/v4/listviews/<resource-name>`

Note: The URL for OpenAir services includes the domain name for your OpenAir account `<account-domain>`. For more information about your account-specific domain name, see the help topic Your Account URLs.

- Your OData feed **User name** and **Password**:

User Name	The user name contains your OpenAir Company ID and User ID, separated by a back slash (\): `<CompanyID>\<UserID>`
Password	Your OpenAir password

Importing Data from Your OData Feed to Microsoft Excel

The steps described in this topic are provided for illustration purposes only. Refer to the vendor documentation for detailed instructions about connecting Microsoft Excel with an OData feed. In Excel 2016 for Windows and later versions, you can use Get & Transform (Power Query) to connect to an OData feed and perform advanced queries. See Import data from external data sources (Power Query) on the Microsoft website for more information .

Use the following steps to connect Microsoft Excel 2016, Excel 2019 or Excel for Office 365 for Windows with data from your OpenAir OData feed.

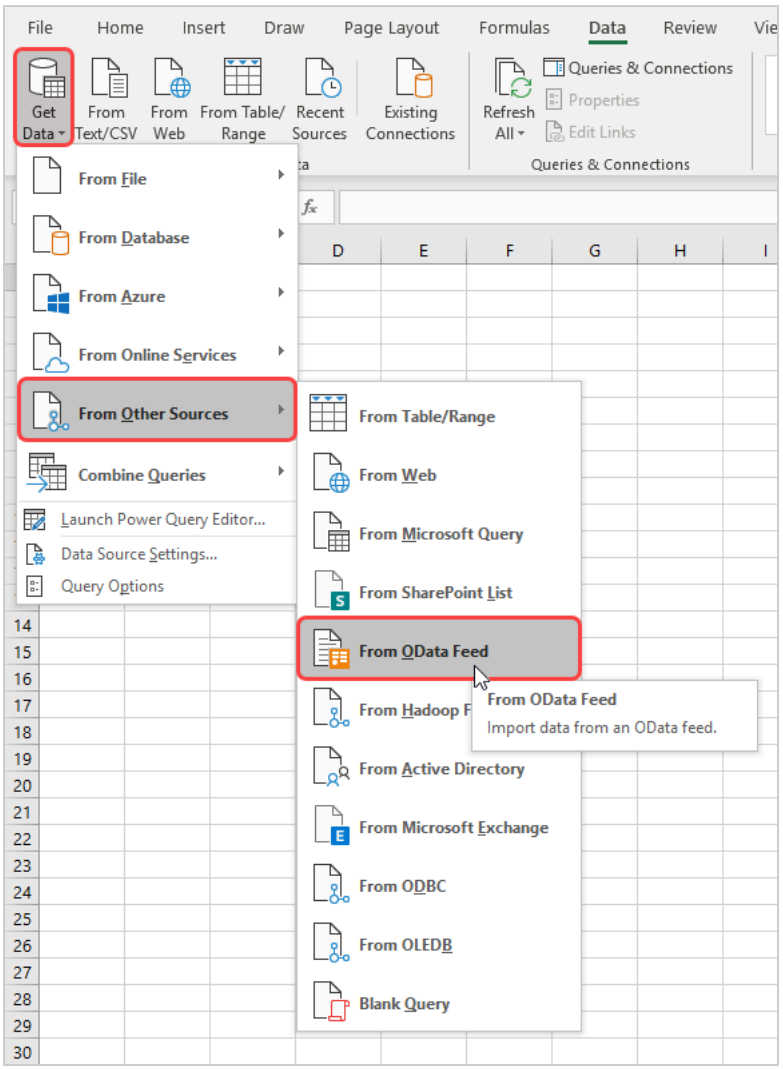
Note: Other versions of Microsoft Excel may not support this functionality natively . In particular:

- **Microsoft Excel for Mac** — You must install an Open Database Connectivity (ODBC) driver for OData to import data from an OData feed into Excel for Mac. See ODBC drivers that are compatible with Excel for Mac on the Microsoft website or search "ODBC driver for OData for Mac" for information about available third-party plug-ins.
- **Microsoft Excel 2013 for Windows** — You must activate the Power Query add-in to connect to external data sources. See Import data from external data sources (Power Query) on the Microsoft website for more information.

To import data from your OData feed to Microsoft Excel for Windows:

1. In Microsoft Excel, click the **Data** tab.
2. Do one of the following
   a. In Microsoft Excel 2019 for Windows or later versions:

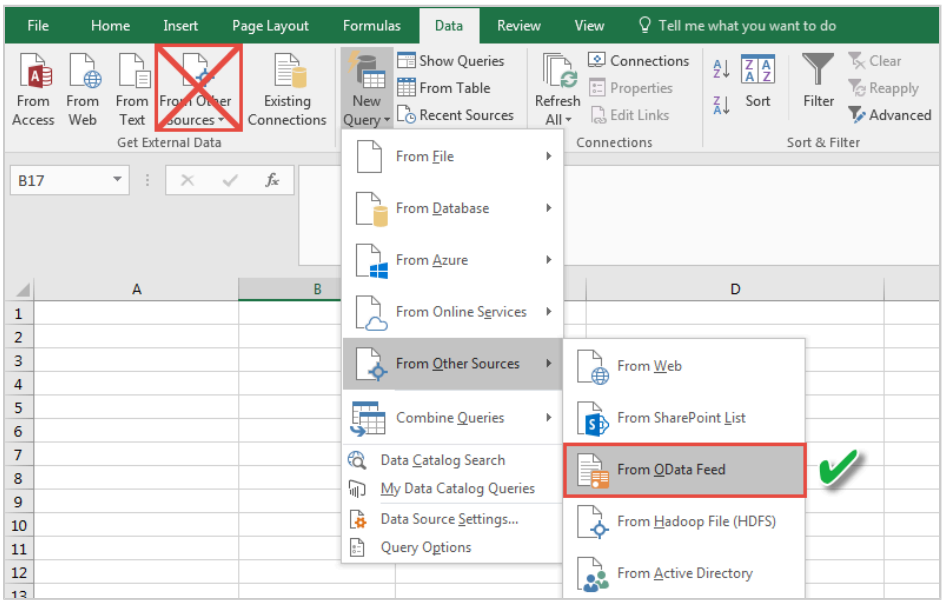
      Click **Get Data**, then point to **From Other Sources** and click **From OData Feed**. If you don't see the **Get Data** button, then click **New Query**, then point to **From Other Sources** and click **From OData Feed**.



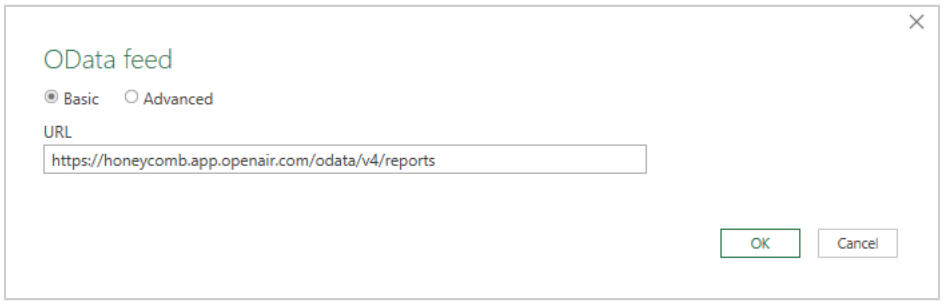
b. In Microsoft Excel 2016 for Windows:

Click **New Query**, then point to **From Other Sources** and click **From OData Feed**.

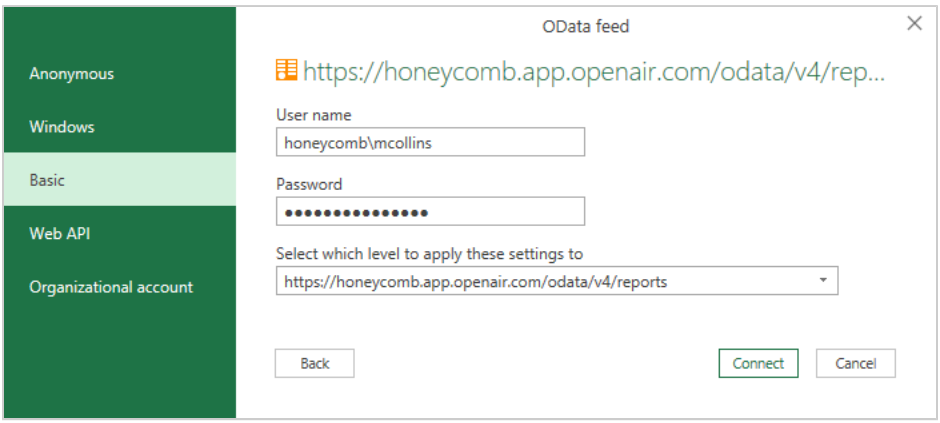
Note: You cannot import your data using the **From Other Sources** option in the **Get External Data** group in Microsoft Excel 2016 for Windows.



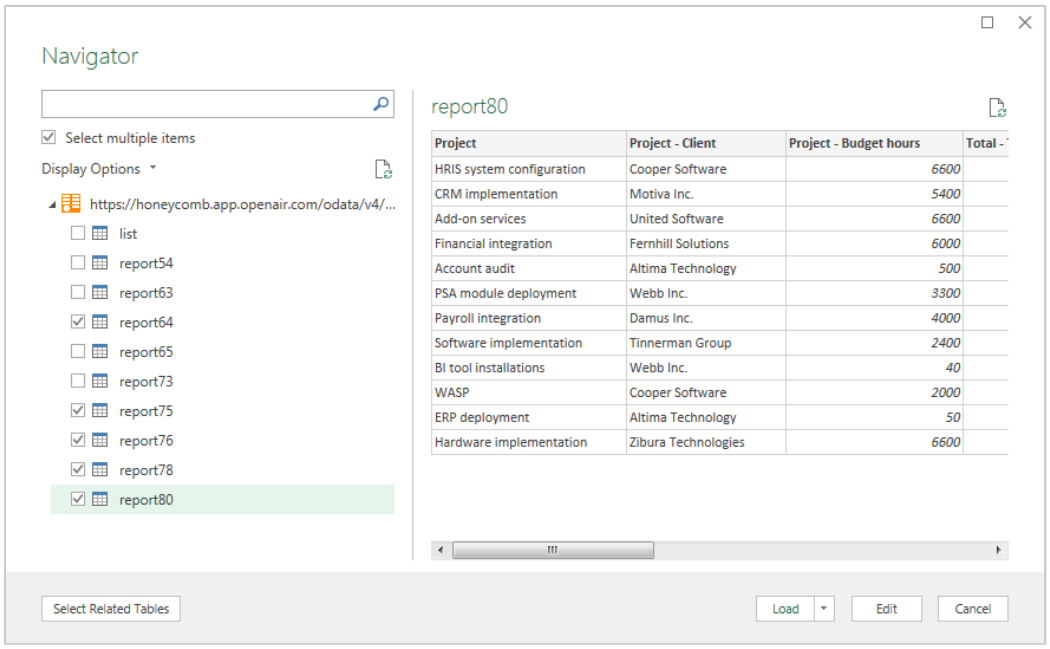
3. In the OData feed popup window, select **Basic** from the radio button options box, and enter the **URL** for the reports or lists resource collections in your OData feed — for more information about your OData feed URL, see Your OData Feed URL and Connection Details.



4. Click **OK**.
5. In the OData feed popup window In the OData feed window:
   a. Click **Basic**.
   b. Enter your OData feed **User name**. Remember, your OData feed user name contains your OpenAir Company ID and User ID, separated by a back slash: `<CompanyID>\<UserID>`
   c. Enter your OpenAir **Password**.
   d. Keep the default option for **Select which level to apply your sign-in settings to** or select one of the dropdown options.



6. Click **Connect**. The Navigator popup window appears.
7. The Navigator popup window lists the published reports or lists available in your OData feed by their OData resource names.
   - Select the resource name for the published report or list you want to import. A preview of the selected resource data appears in the right pane of the Navigator window.
   - To load multiple resources in your Excel workbook , check the **Select multiple items** box then check the box next to the resources you want to import.



> **Tip:** Disable previews in the Navigator popup window to reduce the number of OData requests being made to retrieve these previews. Preview requests count toward the OData request limits allowed for your account. See BI Connector Requirements and Limits. To disable the preview click **Display Options** in the Navigator popup window and clear the **Enable data previews** option.

8. Click **Transform Data** (or **Edit** depending on the Excel version). The **Power Query Editor** appears. You can use the Excel Power Query Editor to shape and transform the report or list data. See Shape data (Power Query) and Edit query step settings (Power Query) on the Microsoft website for more information.

Tip: Rename, remove and reorder columns or filter, sort and reorder your data using the Power Query Editor instead of transforming your report or list data in the spreadsheet. The Get & Transform (Power Query) functionality in Excel lets you apply the same changes to your data every time you refresh your queries and connections. Changes made directly in the spreadsheet will be lost when refreshing the queries and connections.

Note: If you are loading multiple resources into your Excel workbook, Excel creates a separate query for each resource you selected. The queries are listed in the Queries pane on the left of the Power Query Editor window. Click a query to select it for editing, shape and transform your data, and repeat for other queries. See View and Manage Queries in a Workbook (Power Query) on the Microsoft website for more information.

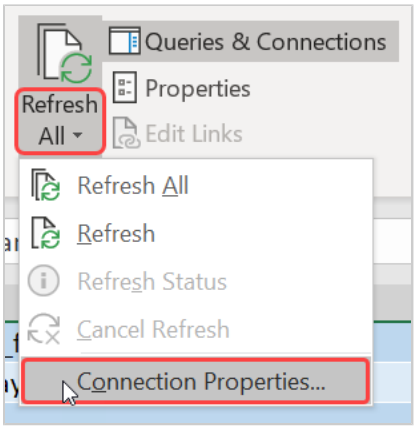
You can edit your queries at any time. Click **Queries & Connections** in the Data tab to view the list of queries. Double click any query listed in the Queries & Connections pane on the right to open it for editing in the Power Query Editor.

9. Click **Close & Load** (or **Apply & Close** depending on the Excel version). The transformed data loads in the Excel spreadsheet.

Note: If you are loading multiple resources into your Excel workbook, Excel loads your data into as many separate sheets as there are queries.

10. (Optional) Configure Excel to refresh your data as required:

    a. On the Excel Data tab, click the Refresh All dropdown and click **Connection Properties ...**. The Query Properties popup window appears.

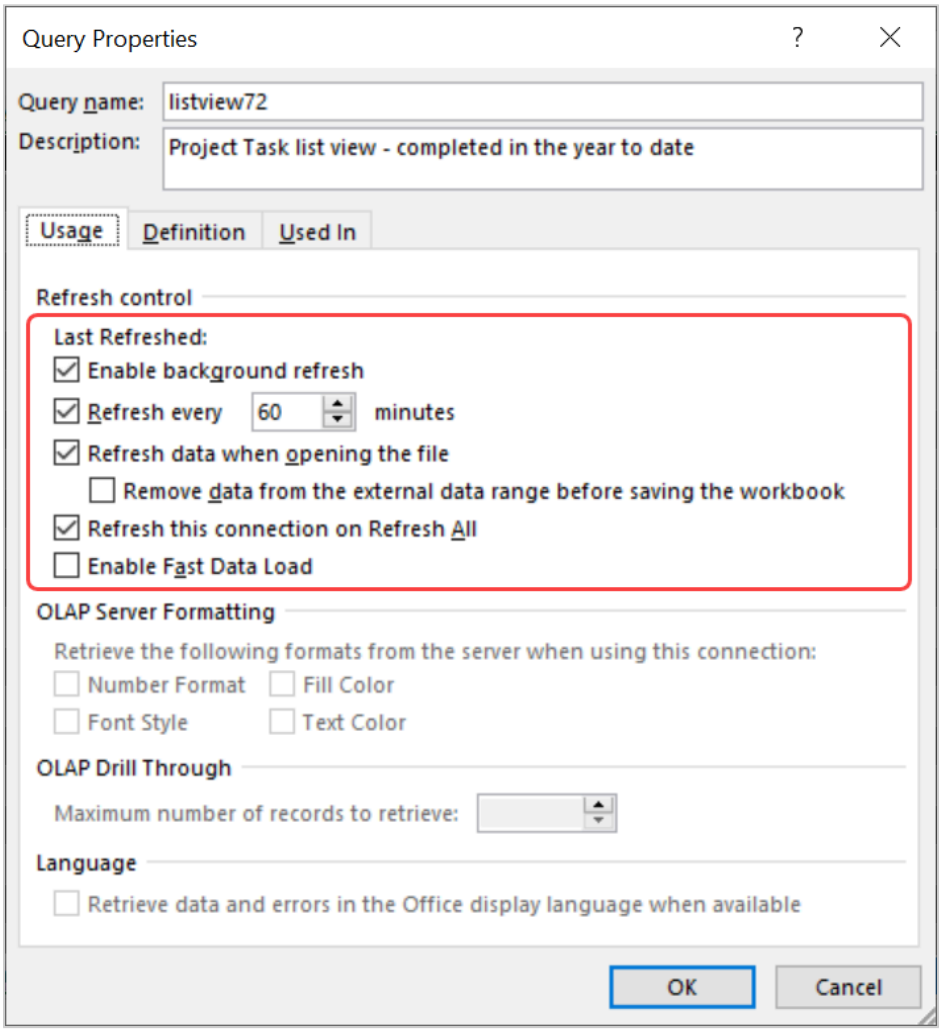


Note: If you are loading multiple resources into your Excel workbook, click **Queries & Connections** to view the list of queries. The queries are l. Right click any query listed in the Queries & Connections pane and click **Properties ...** to configure its properties.

    b. Check the refresh options as required. You can configure Excel to refresh your data using any of the following options:

- Refresh the data automatically at regular intervals. You can specify the refresh interval in minutes.
- Refresh the data automatically when opening the Excel workbook.

- Refresh the data manually by clicking **Refresh All** in the Data tab.



Note: Microsoft Excel caches data from external data sources. You must refresh the data manually or configure the data connection to refresh the data automatically to get the latest data from your OData resource.

In the Excel Data tab, click **Refresh All** to get the latest data from your OData feed and other sources in the entire workbook or click **Refresh** to get the latest data only from the OData resource associated with the worksheet you are currently viewing.

Important: Every data refresh triggers a new request to the OpenAir OData service. Use automatic or manual data refresh sparingly to ensure you stay within the OData requests limits for your account. See BI Connector Requirements and Limits.

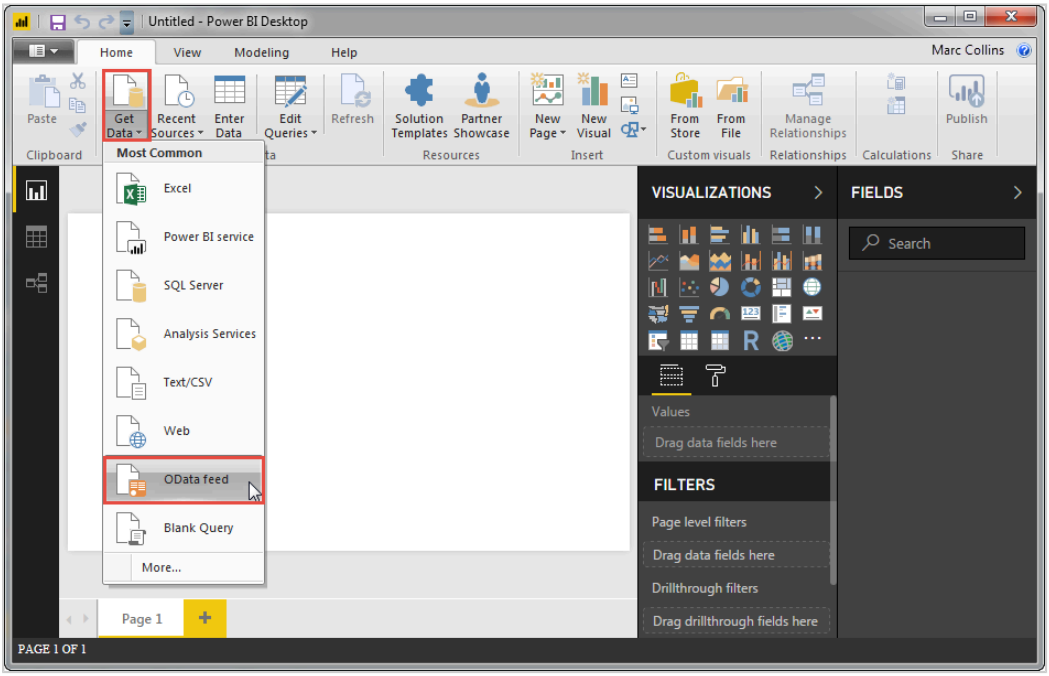
Importing Data from Your OData Feed to Microsoft Power BI Desktop

The steps described in this topic are provided for illustration purposes only. Refer to the vendor documentation for detailed instructions about connecting Microsoft Power BI with an OData feed. The

following section provides steps to connect Microsoft Power BI Desktop version 2.51 (64–bit) to your OpenAir OData feed. Other versions of Microsoft Power BI may not support this functionality.

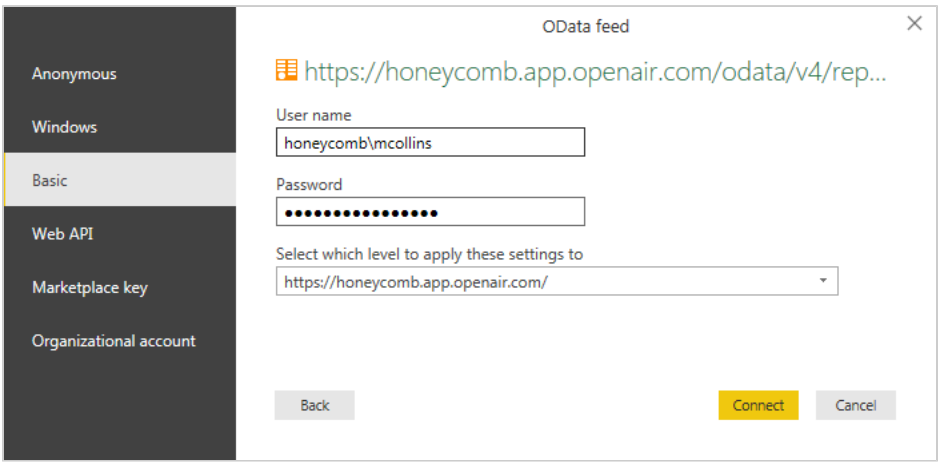
To import data from your OData feed to Microsoft Power BI Desktop:

1. In Microsoft Power BI, click the **Home** tab.
2. Click **Get Data** then **OData Feed**.



3. In the OData feed popup window, select **Basic** from the radio button options box, and enter the **URL** for the reports or lists resource collections in your OData feed — for more information about your OData feed URL, see Your OData Feed URL and Connection Details.

4. Click **OK**.
5. In the OData feed popup window:
   a. Click **Basic**.
   b. Enter your OData feed **User name**. Remember, your OData feed user name contains your Company ID and User ID, separated by a back slash: `<CompanyID>\<UserID>`
   c. Enter your OpenAir **Password**.
   d. Keep the default option for **Select which level to apply your sign-in settings to** or select one of the dropdown options.



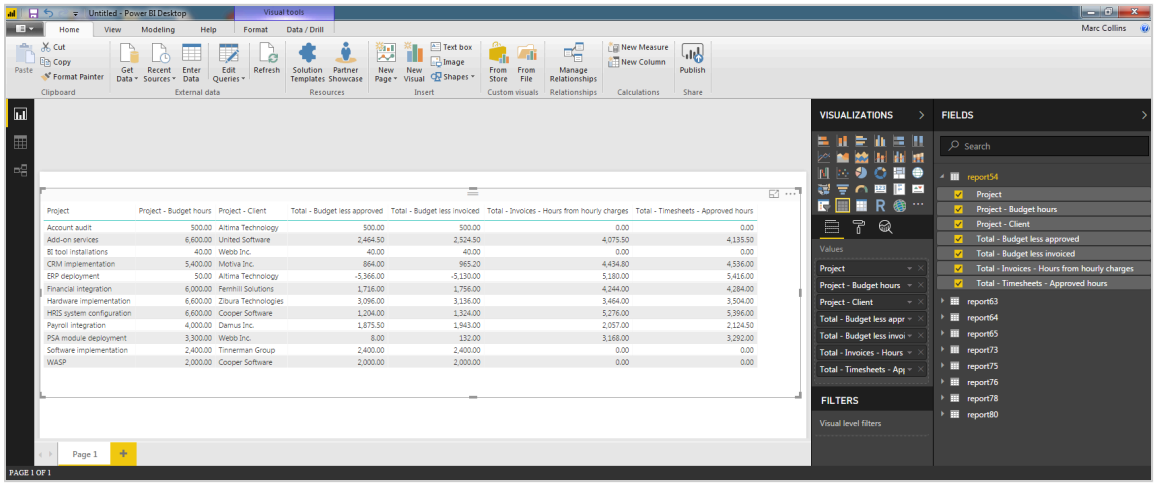
6. Click **Connect**.
7. The Navigator lists the published reports or lists available in your OData feed by their OData resource names.
   - Select the resource name for the published report or list you want to import. A preview of the selected resource data appears in the right pane of the Navigator window.
   - To load multiple resources, check the **Select multiple items** box then check the box next to the resources you want to import.

> **Tip:** Disable previews in the Navigator popup window to reduce the number of OData requests being made to retrieve these previews. Preview requests count toward the OData request limits allowed for your account. See BI Connector Requirements and Limits. To disable the preview click **Display Options** in the Navigator popup window and clear the **Enable data previews** option.

8. Click **Load**. Microsoft Power BI Desktop will load all the selected resources.
9. Use the **Fields** toolbar to access the data for the published reports or lists you imported. Click on a resource name to work to select which fields you would like to include in your Power BI Desktop reports.

Note: Microsoft Power BI Desktop caches data from external data sources. You must refresh the data manually or configure the data connection to refresh the data automatically to get the latest data from your OData resource.

Click the **More options** icon to the right of a report name or field and click **Refresh data** to get the latest data from your OData feed.



Business Intelligence Connector Advanced Functions

You can use the following advanced functions to get more out of your OpenAir list and report data after you publish your lists and reports to the Business Intelligence (BI) Connector.

Viewing Your OData Resource Data in a Web Browser

The published resource data in your OpenAir OData feed is available as a JSON string. JSON (JavaScript Object Notation) is a lightweight data-interchange format which is self-describing and easy to understand.

You can enter the URL to your OData resource in the address bar of your browser and read your published OpenAir resource data in your web browser.

To view your OData resource data in a web browser:

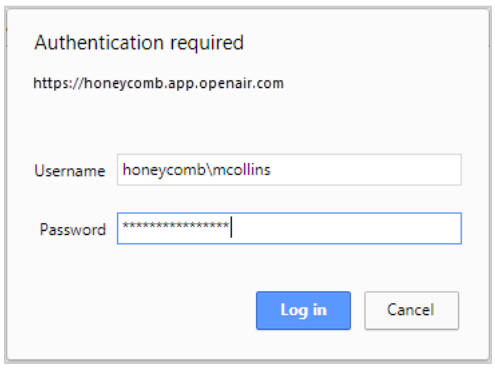
1. Enter the URL for the OData resource you want to access. The Authentication required popup window appears.

   Note: For more information about OData resources URLs, see Your OData Feed URL and Connection Details. For example, to access the data for the published report with resource name `report54`, use the following URL:

   `https://<account-domain>/odata/v4/reports/report54`

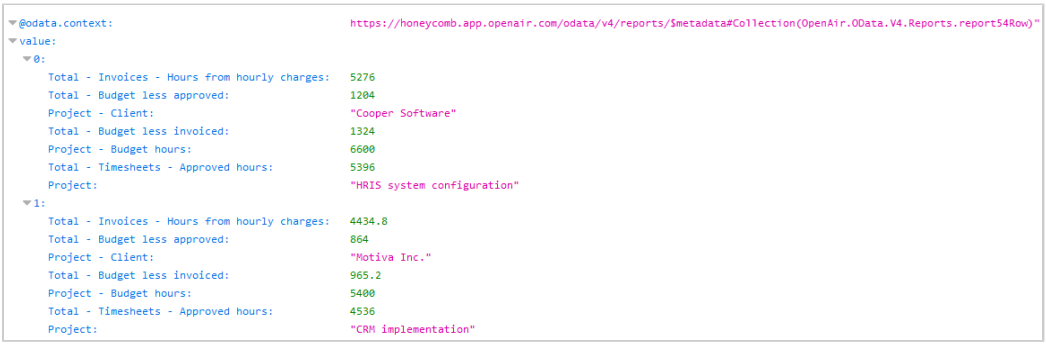
2. Enter your OData feed **User name** and your OpenAir password, then click **Log in**.

   Note: Remember, your OData feed user name contains your OpenAir Company ID and User ID, separated by a back slash: `<CompanyID>\<UserID>`



3. Your data appears as a JSON string in your browser. For more information about the JSON object and its properties, see OData Response.

> **Tip:** You can use a browser extension to change the way your browser displays the JSON string. Instead of displaying the JSON string as plain text, your browser will display the JSON in a way that is much easier to read. Search for "JSON viewer" browser extensions. Refer to your browser documentation for information about adding browser extensions.



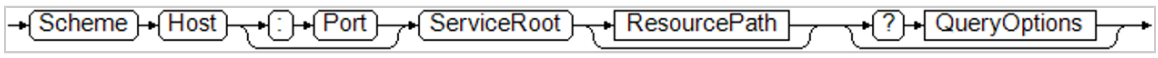
If a published report is refreshed while you are reading or paging through the published report in your browser, the OData feed returns a `410 Gone` HTTP status error with the message "`Report has been republished. You need to reload the report.`".

OData Query Options

The OpenAir OData feed lets you use the following query options to return the information you need:

- `$filter` — See $filter Query Options
- `$select` — See $select Query Option
- `$skip` — See $top and $skip Query Options
- `$top` — See $top and $skip Query Options

Add the query options as query string parameters at the end of the URL for the OData resource you want to access. To append query options to the end of the OData resource URL, add a question mark ? followed by query option and value pairs `<$option>=<value>` separated by an ampersand &.



$filter Query Options

You can add the `$filter` query option at the end of the OData resource URL to return only results that match the filter expression specified.

Add the `$filter` query option at the end of the OData resource URL to return only results that match the filter expression specified.

`https://<account-domain>/odata/v4/reports/report279?$filter=<expression>`, where `<expression>` is a logical expression. The operators and functions supported for use with the filter query option are listed in the following tables.

- **Comparison Operators** — The syntax for comparison operators is `<column> <operator> <value>`, where:
  - `<column>` is the column name
  - `<operator>` is the comparison operator
  - `<value>` is the comparison value

Operator	Description	Example
`eq`	Equals	The following example requests all expense receipts owned by employees whose name is 'Smith'. `https://<account-domain>/odata/v4/reports/report279?$filter=Name eq 'Smith'`
`ne`	Not equal	The following example requests all The following example requests all expense receipts owned by employees whose name is not 'Smith'. `https://<account-domain>/odata/v4/reports/report279?$filter=Name ne 'Smith'`
`gt`	Greater than	The following example requests all expense receipts with a total value greater than 1000. `https://<account-domain>/odata/v4/reports/report279?$filter=Total gt 1000`
`ge`	Greater than or equal	The following example requests all expense receipts with a total value greater than or equal to 1000. `https://<account-domain>/odata/v4/reports/report279?$filter=Total ge 1000`
`lt`	Less than	The following example requests all expense receipts with a total value less than 1000. `https://<account-domain>/odata/v4/reports/report279?$filter=Total lt 1000`
`le`	Less than or equal	The following example requests all expense receipts with a total value less than or equal to 1000. `https://<account-domain>/odata/v4/reports/report279?$filter=Total le 1000`

- **String Comparison Functions** — The syntax for string comparison functions is `<function>(<column>,<string>)`, where:
  - `<function>` is the comparison function
  - `<column>` is the column name
  - `<string>` is the comparison string between single quotation marks

Function	Description	Example
`startswith(<column>,<string>)`	Starts with	The following example requests all expense receipts associated with projects with a name that starts with 'Hardware impl'. `https://<account-domain>/odata/v4/reports/report279?$filter=startswith(Project_Name,'Hardware impl')`

Function	Description	Example
`endswith(<column>,<string>)`	Ends with	The following example requests all expense receipts associated with projects with a name that ends with 'ware implementation'. `https://<account-domain>/odata/v4/reports/report279?$filter=endswith(Project_Name,'ware implementation')`
`contains(<column>,<string>)`	Contains	The following example requests all expense receipts associated with projects with a name that contains 'software'. `https://<account-domain>/odata/v4/reports/report279?$filter=contains(Project_Name,'software')`

- **Logical and Precedence Grouping Operators**

Operator	Description	Example
`not`	Logical not	The following example requests all expense receipts associated with projects with a name that does not contain 'software'. `https://<account-domain>/odata/v4/reports/report279?$filter=not contains(Project_Name,'software')`
`and`	Logical and	The following example requests all expense receipts owned by employees whose name is 'Smith' and with a total value greater than or equal to 1000. `https://<account-domain>/odata/v4/reports/report279?$filter=Name eq 'Smith' and Total ge 1000`
`or`	Logical or	The following example requests all expense receipts owned by employees whose name is not 'Smith' or with a total value less than or equal to 1000. `https://<account-domain>/odata/v4/reports/report279?$filter=Name ne 'Smith' or Total le 1000`
`()`	Precedence grouping	The following example requests all expense receipts owned by employees whose name is 'Smith' and with a total value either greater than or equal to 1000 or less than 500. `https://<account-domain>/odata/v4/reports/report279?$filter=Name eq 'Smith' and (Total ge 1000 or Total lt 500)`

Important: Review the following guidelines:

- The query string parameter must be all lower case. If you add `$Filter=<expression>`, for example, the filter option will be ignored and all data will be returned.
- The query string parameter must be immediately followed by an equal sign with no space in between. Adding `$filter =<expression>` will return an error.
- Column names are case sensitive.
- Column names cannot include spaces. You should enable the Replace Non-Alphanumeric Characters with Underscores in Column Titles and Metadata optional feature.
- All string values in the logical expression must be between single quotation marks.
- String values in the logical expression are case insensitive. The same results will be returned whether you add `$Filter= Name eq 'Smith'` or `$Filter= Name eq 'smith'`.

$select Query Option

Use select and filter expressions in OData requests to return only the information you need.

You can add the `$select` query option at the end of the OData resource URL to return only the columns specified.

`https://<account-domain>/odata/v4/reports/report279?$select=<columns>`, where `<columns>` is a comma separated list of column names.

Example 1. $select

The following URL returns only the Name and Total columns from `report279`.

```
https://<account-domain>/odata/v4/reports/report279?$select= Name, Total
```

Important: Review the following guidelines:

- The query string parameter must be all lower case. If you add `$Select= Name, Total`, for example, the select option will be ignored and all columns will be returned.
- The query string parameter must be immediately followed by an equal sign with no space in between. Adding `$select = Name, Total` will return an error.
- Column names are case sensitive.
- Column names cannot include spaces. You should enable the Replace Non-Alphanumeric Characters with Underscores in Column Titles and Metadata optional feature.
- It is not possible to specify the column order in the data returned using the `$select` parameter. Columns are always returned in the same default order, independently of the order of columns listed in the OData request.

$top and $skip Query Options

You can add the `$top` and `$skip` query options at the end of the OData resource URL to return to return specific numbers of records.

- Use `$top` to specify how many records to return.
- Use `$skip` to specify the number of records to ignore (or to skip) before returning records.

Example 2. $top and $skip

The following URL returns up to 20 records from `report279`. It skips the first 10 records and returns the next 20 records.

```
https://<account-domain>/odata/v4/reports/report279?$skip=10&$top=20
```

Important: Review the following guidelines:

- The query string parameter must be all lower case. If you add `$Top=10`, for example, the top option will be ignored and the maximum number of rows will be returned.
- The query string parameter must be immediately followed by an equal sign with no space in between. Adding `$top =10` will return an error.

Reading Published Resource Data in Form and Scheduled Scripts in OpenAir

You can access your published list and report data in your form and scheduled scripts using the following functions:

- Read the list of published lists and reports available to the user running the script using `NSOA.listview.list()` and `NSOA.report.list()`.

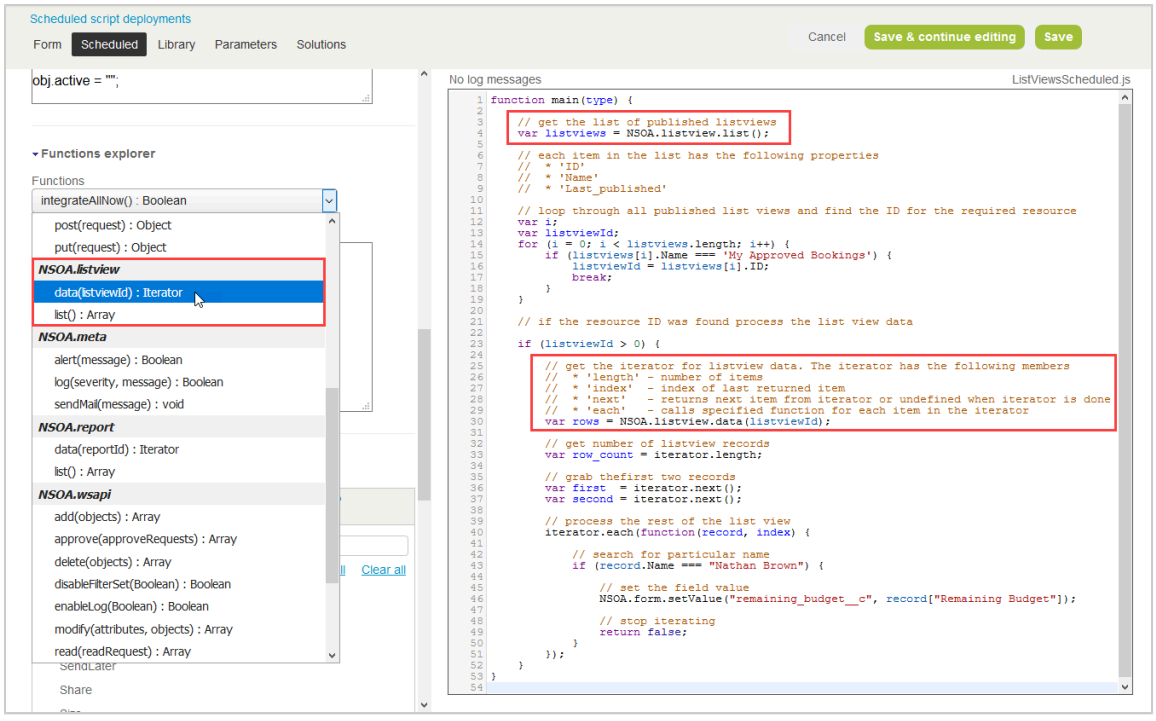
- Read the published list or report data available to the user running the script using `NSOA.listview.data(listviewId)` and `NSOA.report.data(reportId)`

User scripting support for reading your published resource data has the following benefits:

- The `NSOA.listview` and `NSOA.report` functions give you access to the same information available when you use BI tools to access your published resource data.
- Reading OData resource data using the `NSOA.listview` and `NSOA.report` functions does not use any of your BI Connector request entitlement — see BI Connector Request Limits
- You can read data from all published reports in your user scripts. You can also publish reports exclusively for use in your user scripts. When using the `NSOA.report.list()` user scripting function to read the list of published reports, each item in the list has the property `PublishType` — The scope of use specified for the published report.
- You can use published lists like custom queries and read the latest list data in your form and scheduled scripts. The data read by your scripts is the same as the data you can see in your list at any given time.

For more information, see the User Scripting.

Important: Both form and scheduled scripts support the `NSOA.listview.data(listviewId)` function. However, the number of items you can process in form scripts is restricted by their run time limit. The function is best suited for reading published list data in scheduled scripts, which allow up to 1 hour of JS runtime.



Exporting OpenAir Published Report Data to NetSuite

You can export your published report data from OpenAir to custom records in NetSuite using OpenAir NetSuite Connector. To do so:

1. Publish OpenAir reports with the scope (publish type) "NetSuite Connector". See Published Report Scope of Use.
2. Configure OpenAir to refresh your published report data according to a defined schedule. See Configuring OpenAir to Publish Reports Automatically and Refresh Published Reports Periodically.

   Important: The following guidelines apply when publishing a report for export to NetSuite using OpenAir NetSuite Connector:

   - The owner of the report must be the same account administrator as the dedicated **Integration user** selected on the OpenAir NetSuite Connector Credentials tab.
   - The published report cannot be shared with others. Use the default **Do not share** permission setting. If you select a different permission setting, it will be reset automatically to **Do not share** when publishing the report.
   - The published report scope of use (**Publish type**) cannot be changed if the report was previously published for use with OpenAir NetSuite Connector and a custom integration workflow to export the published report data exists.
3. Create a custom export workflow to export data from your OpenAir published report to a custom record type in NetSuite. You can map your OpenAir published report data to NetSuite custom record fields and define filters to export exactly what you need. See NetSuite Integration.
4. Add this custom export workflow to workflow groups and include them in your scheduled integration runs. See NetSuite Integration.

After you export your OpenAir published report data to NetSuite, you can create reports and dashboards in NetSuite to gain visibility into KPIs such as profitability and revenue forecast, combining NetSuite and OpenAir data.

Consuming OpenAir OData Resource Data in Your Applications

Developers can request OpenAir OData resource data and process the response from the OpenAir OData service in their applications.

There are two types of information available from the OData service:

- The metadata (OData EDMX XML schema v 4.0) describes the collection data types and bears information about the order of fields for each entity (resource or list of resources).
- The data itself (JSON) provides the raw data as a JSON string.

Applications consuming resources from the OData service should consume the data and the metadata jointly.

Note: The OData service only supports the HTTP `GET` method.

GET Request

Send a GET request to the OpenAir OData service method.

- The GET request URL uses one of the following formats:
  - To access the collection of resources: `https://<account-domain>/odata/v4/<collection>`
  - To access the resource collection metadata: `https://<account-domain>/odata/v4/<collection>/$metadata`
  - To access the list of resources in the collection: `https://<account-domain>/odata/v4/<collection>/list`
  - To access a resource: `https://<account-domain>/odata/v4/<collection>/<resource>`

  Where:
  - `<account-domain>` is the account-specific domain name for the OpenAir account. For more information about your account-specific domain name, see the help topic Your Account URLs.
  - `<collection>` depends on the type of resource you are requesting: `reports` or `listviews`.
  - `<resource>` is the OData resource name of the resource you are requesting.

  For more information, see Your OData Feed URL and Connection Details.
- The request must include an Authentication header using the HTTP Basic authentication scheme.
  - Use the following format: `<CompanyID>\<UserID>:<Password>`.
  - The string value is Base64 encoded.
- (Optional) Use query options to page through the resource data. The OpenAir OData service supports the query options `$skip` and `$top` either in the request body or as query string parameters in the request URL. For more information see OData Query Options.

Example of GET request:

The following examples accesses rows 501 to 750 of the published list `listview12` from the authenticated user's OpenAir OData feed.

```
GET /odata/v4/listviews/listview12 HTTP/1.1
Host: honeycomb.app.openair.com
Authorization: Basic ZG9jc191aTRfZGVtb1xtY29sbGluczpUaGlzIGlzYSB2ZXJ5IGxvbmcgcGFzc3dvcmQgeW91IHdvdWxkIG5ldmVyZ3Vlc3M=
Content-Type: application/x-www-form-urlencoded

$top=250&$skip=500
```

OData Response

If you request a collection, a resource or the list of resources, the OpenAir OData service returns the response as a JSON string with the properties described in the following table.

JSON object properties	Description

`@odata.context`	The URL for the collection metadata. The metadata is provided in XML format for the entire resource collection using the OData EDMX XML schema v 4.0 (http://docs.oasis-open.org/odata/ns/edmx). When requesting a specific entity (a resource or the list of resources in the collection), the metadata URL points to that entity.
	For example:
	■ If requesting the list of resources in the collection, the response includes the following metadata URL:
	`https://honeycomb.app.openair.com/odata/v4/listviews/$metadata`
	■ If requesting a specific resource, the metadata URL points to the metadata for the requested resource:
	`https://honeycomb.app.openair.com/odata/v4/listviews/$metadata#Collection(OpenAir.OData.V4.ListViews.listview12Row)`

JSON object properties	Description
	For each entity, the metadata includes the list of fields — or Properties — listed in the same order as they appear in the report or list layout in OpenAir. Each Property as the following attributes: ■ `Name` — the field name. ■ `Type` — the data type e.g `Edm.Double` for double decimal, `Edm.String` for string, `Edm.Date` for date.
`value`	An array of objects. ■ If requesting the collection, each object correspond to an entity in the collection (either a resource or the list of resources). The objects in the `value` array have the following properties: □ `kind` — The value of this property is always `EntitySet`. □ `name` — The OData resource name. For example, `listview12` or `list` (for the list of resources). □ `url` — The relative url path for the OData resource. It is always the same as `name`. □ `title` — The resource title in OpenAir. ■ If requesting the list of resources, each object corresponds to a resource in the collection. The objects in the `value` array have the following properties: □ `Last Published` — The timestamp when the report or list was last published. □ `PublishType` — The scope of use specified for the published report. □ `ID` — The published report or list layout OData resource ID. □ `Rows` — The number of rows of datain the published report (for Reports only). □ `Name` — The name of the report or list layout. ■ If requesting a specific resource, each object corresponds to a row of data in the resource. The objects properties correspond to the field names or the report or list column headings. ⚠ **Important:** The object properties or columns in the `value` array are given in their default order. The order of columns as they appear in the OpenAir report or list layout is specified in the metadata. The data types for each column is also provided in the metadata.
`@odata.count`	The number of rows in the OData feed entity (either a resource or the list of resources).
`@odata.nextLink`	The request URL to use to obtain the next rows of resource data, if the resource data continues beyond the last row return in the `value` array.

Reading Published Reports Data Using OpenAir REST API

You can use the `/published-reports/` REST API endpoint to read reports published to the BI Connector from a GUI REST Client such as Postman, for example. Developers can use the `/published-reports/` REST API endpoint to read published report data and process the response in their applications.

The following methods are available:

- **GET** `/published-reports/` — Use this method to retrieve the list of published reports with general information about each published report in the list. See the help topic Get the List of Published Reports.

- **GET** `/published-reports/{id}` — Use this method to retrieve the data in the published report with the specified internal ID. Get a Published Report.

> **Note:** The publish status information given when you publish a report manually includes the full REST API endpoint for this published report (with the internal ID `{id}`).

Guidelines

Review the following guidelines:

- Reports must be published with the `Business Intelligence Connector` scope (publish type) to be available from the `/published-reports/` REST API endpoint. See Published Report Scope of Use.
- The API Access or REST API add-on services are not required to access the `/published-reports/` REST API endpoint. Other REST API endpoints are not available unless API Access and REST API are enabled for your company's OpenAir account.
- For more information about using the REST API, see the REST API documentation and Getting Started with the REST API.
- The OAuth 2.0 authorization code flow must be used to authenticate your requests when connecting to your published report data through the REST API. One advantage of this authentication method is that you can access reports published to the BI Connector whether you sign in to OpenAir using a password or single sign-on.

> **Note:** By contrast, it is only possible to access your published report data through the OData service if you sign in to OpenAir using a password.

  - You must register the client application with OpenAir before you can use the REST API to access BI Connector resources. See the help topic Managing API Integration Applications.
  - You must used an access token issued for the relevant scope to authenticate your request (the scope must include `bi`). For more information, see the help topics Authentication and OAuth 2.0 Authorization Code Flow.
- If API Access is enabled for your account, Accessing published reports using the REST API does not use any of your API request entitlement. It is only subject to BI Connector request frequency limits. Each API call using one of the following methods uses at least one BI Connector request. See BI Connector Request Limits.

Replace Non-Alphanumeric Characters with Underscores in Column Headers and Metadata

This optional feature replaces all non-alphanumeric characters with underscores in the column headers and the metadata of your published resources. It also replaces space characters in column titles with underscore characters.

To enable this feature, contact OpenAir Customer Support and request the **Replace Non-Alphanumeric Characters with Underscores in Column Titles and Metadata** feature.

report82

User	Leave_accrual_rule	Accrual
Adams, Mary	Corporate sick days	160
Carr, Bill	Corporate sick days	160
Carter, Tom	Vacation Accrual rule	316
Collins, Marc	Vacation Accrual rule >5 years Tenure	168
Davis, Judy	Vacation Accrual rule	316
Ellis, Ed	Vacation Accrual rule >5 years Tenure	199
Foster, Tim	Vacation Accrual rule	300
Fox, Rebecca	Vacation Accrual rule	320
Garcia, Juan	Vacation Accrual rule	296

Note: Other special characters are also replaced with underscores, including: **%?!@:~`+-#$^ &*()ů!§¨|**. Non-latin characters are also replaced with underscores. For examplec **## ###** or **Кири ллица** would also be replaced with underscores.

Troubleshooting the Business Intelligence Connector Feature

This chapter will help you to diagnose errors which you might encounter when using the Business Intelligence (BI) Connector feature, and offer solutions to help you resolve them.

I can't see a "Publish reports" role permission when I go to Administration > Global Settings > Users > Roles > [Select a role]

The **Publish reports** role permission is only available if your company has purchased the use of the BI Connector feature and OpenAir Customer Support has completed the setup for your account.

If you cannot see the **Publish reports** role permission, first contact your OpenAir account manager and ensure that you have purchased access to this feature.

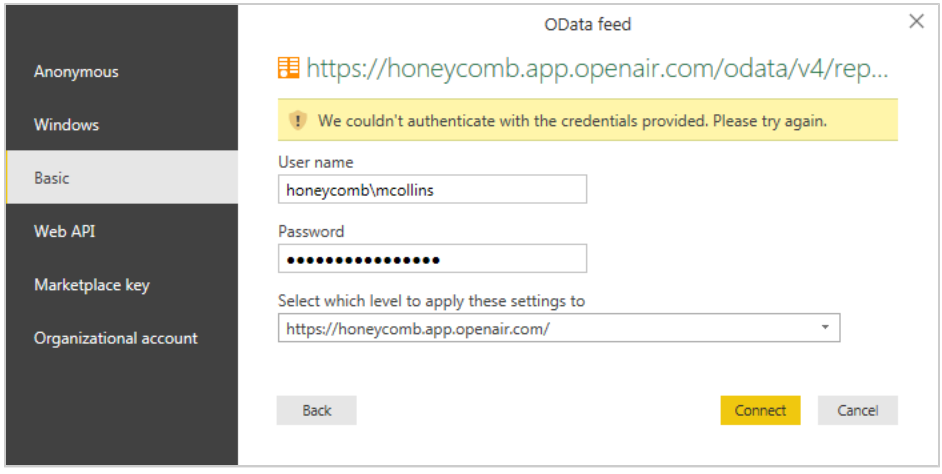
If you have confirmed that your company should have access to this feature, contact OpenAir Customer Support and confirm that they have finished setting up the feature for your account.

There is no "Publish" icon next to my saved reports.

You won't be able to publish reports if your account administrator hasn't assigned you the **Publish reports** role permission.

Confirm that your account administrator has assigned you the **Publish reports** role permission.

My business intelligence tool cannot authenticate my credentials.



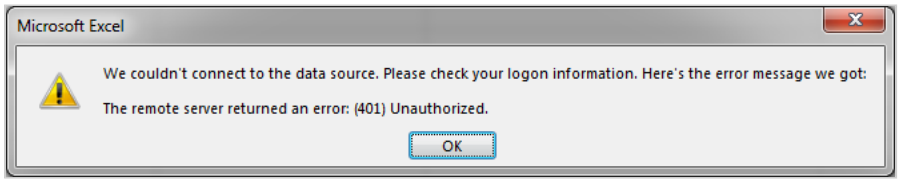
If you receive a message from your business intelligence tool saying that it cannot authenticate your credentials, you may have incorrectly typed your OData resource URL, User Name, or password, or you may be using the wrong credentials for your OData feed.

Confirm that you have entered the correct OData resource URL, User Name and Password.

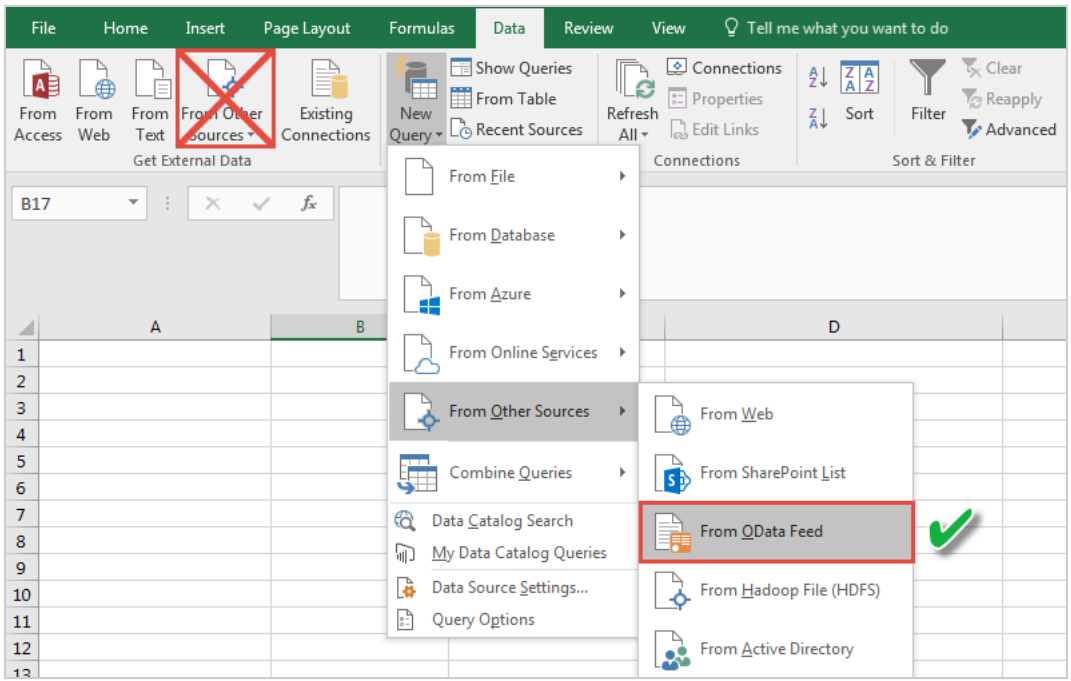
Note: Pay special attention to the slash between the Company ID and User name. You should use a **back slash (\)** and not a forward slash (/) between these two IDs.

My credentials and OData resource URL are correct, but I still get an error message from my BI tool.

This problem is known to occur with some versions of Microsoft Excel. It is possible that Excel is trying to connect to your OData feed as a V3 service and not a V4 service, and since V3 services are incompatible with the BI Connector feature, you will receive an error.

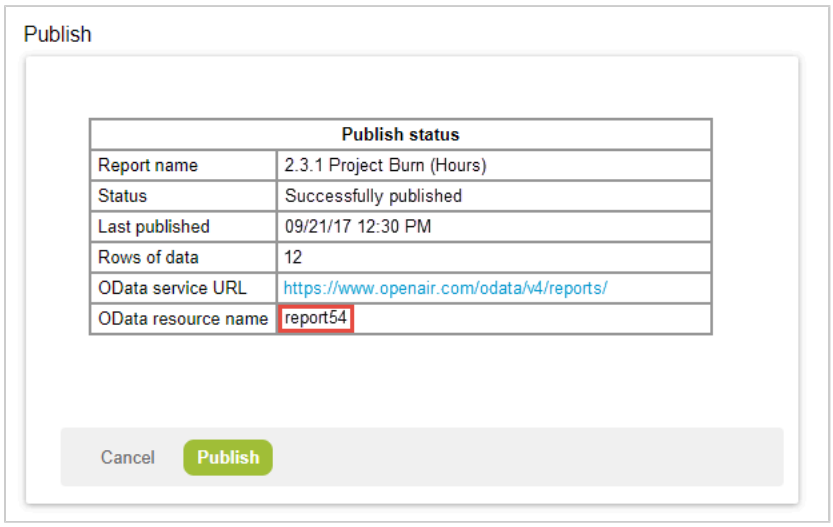


If using Microsoft Excel to connect to your OData feed, be sure to select the feed by going to the Data tab, then clicking New Query > From Other Sources > From OData Feed. Selecting any other options for connecting to the feed will result in an error.



My report doesn't appear in the list of published reports in my BI tool.

Each published report has a unique ID number which identifies it. OpenAir provides this report ID in the **OData resource name** field when you publish the report. For example, in the screenshot below, the report ID is **report54**:



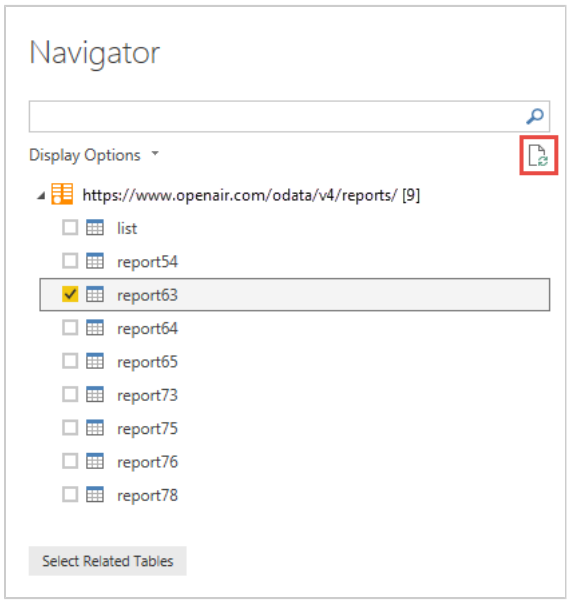
First, confirm that you are looking for the correct report ID. If the report ID is correct, confirm that you have published the report with the `Business Intelligence Connector` scope (publish type).

If the report is a scheduled report, confirm that it has been published according to its schedule.

My report data appears out of date in my BI tool.

This can occur if your BI tool caches report data.

To be sure that you have the latest report data, use your BI tool's refresh option to pull the latest data.



Report data which I could previously see is now gone.

This can happen if a report you previously loaded was deleted.

To see the report data, publish the report again and load it into your BI tool again.

Business Intelligence Connector Version History

October 12, 2024

- Ability to read published report data using the the `/published-reports/` REST API endpoint. See Reading Published Reports Data Using OpenAir REST API.
- Updated the Business Intelligence Connector Limits page with a breakdown of requests to the OData service and REST API endpoint. See BI Connector Request Limits.

April 13, 2024

- The OpenAir OData feed returns a `410 Gone` HTTP status error if a published report is refreshed while you are reading or paging through that published report – See Connecting BI Tools to Your OData Feed and Viewing Your OData Resource Data in a Web Browser.
- The **Last published** timestamp now shows the date and time when the report publication completed and the published report data became available in your OData feed. Previously, it showed the time when the publication process started – See Publishing Your Reports Manually, Publishing Reports Others Have Shared with You and Verifying the Publication Status of your Reports.

October 7, 2023

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April 15, 2023

The OData reports storage was changed to resolve a previous column number limitation that prevented the publication of reports with a large number of columns.

October 8, 2022

Ability to control who can view the OData Limits page by role permission. See BI Connector Request Limits.

April 9, 2022

Support for `$select` and `$filter` query options to retrieve exactly the information you need from your published lists and reports. See OData Query Options.

October 9, 2021

- Ability to choose the scope of use for your published reports , including the ability to publish a report for use with OpenAir NetSuite Connector, or for use with User Scripting only. See Published Report Scope of Use.

  See also:

  - Publishing Your Reports Manually — Ability to choose scope of use.
  - Configuring OpenAir to Publish Reports Automatically and Refresh Published Reports Periodically — Ability to choose scope of use and select second refresh time on the same day.
  - Reading Published Resource Data in Form and Scheduled Scripts in OpenAir — Ability to read scope of use information and choose publish reports for use with user scripting exclusively.
- Ability to export published report data from OpenAir to custom records in NetSuite using OpenAir NetSuite Connector. See Exporting OpenAir Published Report Data to NetSuite.

April 10, 2021

Support for the following lists: Workspaces module: Discussions, Documents. See Publishing Lists.

October 10, 2020

- Support for the following lists in the Administration module: Job codes, Customers, Contacts. See Publishing Lists.
- Added publication status in the Manage list view settings popup and administration page. See Managing Published Lists.

April 18, 2020

- Extended list coverage. See Publishing Lists.
- Added OData Limits administration page. See BI Connector Request Limits.

October 13, 2018

- Added ability to publish lists. See Publishing Lists.
- Increased the Per Minute Request Limit to 500 requests per account per minute (up from 70 requests per minute). See BI Connector Requirements and Limits.

April 14, 2018

- Added ability to share published reports with other employees. See Sharing Published Reports With Other Employees in Your Company.
- Added Replace Non-Alphanumeric Characters with Underscores in Column Headers and Metadata.

October 14, 2017

- Business Intelligence Connector feature introduced.
- Added ability to publish saved reports to the OpenAir OData feed.
- Added `$top` and `$skip` query options.
- Added ability to access OpenAir OData feed resource data in a web browser.