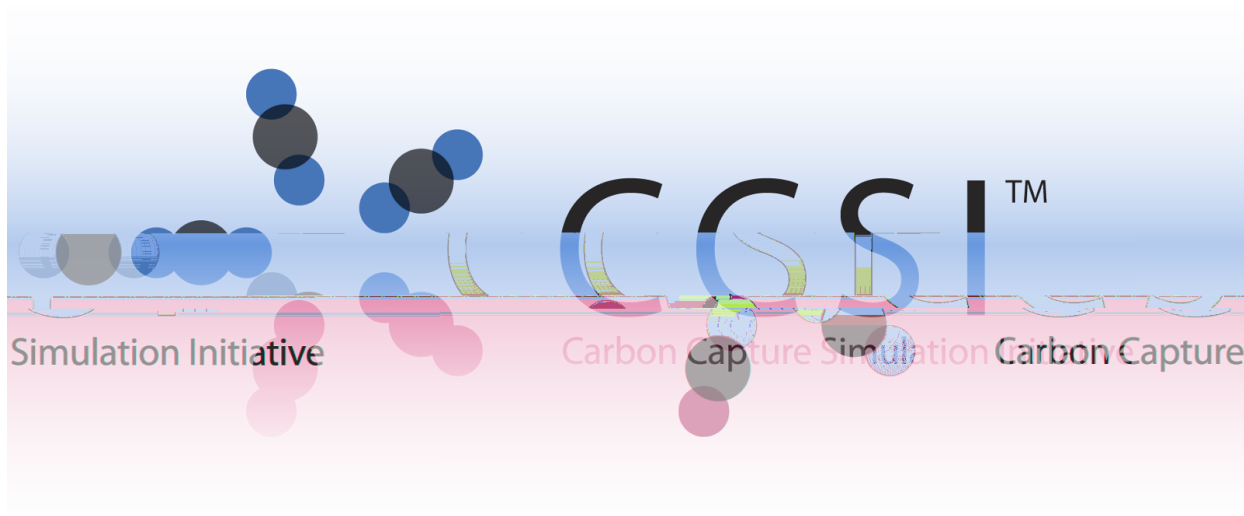


Integration Framework



TurbineLite Installation Guide

Version 2016.06.1
July 12, 2016

This material was produced under the DOE Carbon Capture Simulation Initiative (CCSI), and copyright is held by the software owners: ORISE, LANS, LLNS, LBL, PNNL, CMU, WVU, et al. The software owners and/or the U.S. Government retain ownership of all rights in the CCSI software and the copyright and patents subsisting therein. Any distribution or dissemination is governed under the terms and conditions of the CCSI Test and Evaluation License, CCSI Master Non-

Disclosure Agreement, and the CCSI Intellectual Property Management Plan. No rights are granted except as expressly recited in one of the aforementioned agreements.

- [1. Introduction](#)
- [2. Prerequisites](#)
 - [Operating System](#)
 - [Hardware](#)
 - [Required Software](#)
 - [Optional Software](#)
 - [Client Software](#)
- [3. Installation](#)
- [4. Configuration](#)
 - [A. Web API](#)
- [5. Directory Setup](#)
 - [Clients](#)
 - [Logs](#)
 - [AspenSinterConsumerWindowsServiceLog.txt](#)
 - [ExcelSinterConsumerWindowsServiceLog.txt](#)
 - [TurbineWebAPILog.txt](#)
 - [Web](#)
- [6. Installation Tests](#)
 - [A. Turbine Web API](#)
 - [B. Turbine Aspen ACM](#)
- [7. Uninstall](#)
- [8. Reporting Installation issues](#)

1. Introduction

The Turbine Science Gateway (TSG) is a web application and execution environment for running and managing scientific applications and storing and archiving results. Clients interact with the Turbine resource oriented architecture through a RESTful web interface, either directly over HTTP or using the higher-level Python client API. The Python API is designed to be easily scriptable, returning structured JSON output that can be easily consumed by other tools. Turbine is a generic solution that can be extended to process modeling and simulation applications. Currently, AspenTech's AspenPlus and Aspen Custom Modeler applications, Process Systems Enterprise gPROMS, and Microsoft Excel are supported.

TurbineLite is the single workstation release of the TSG, with minimal software dependencies. Note most users will want to install the FOQUS Bundle, this software includes TurbineLite and most of its dependencies and is the simplest way to install TurbineLite and FOQUS.

2. Prerequisites

Operating System

- Windows Server 2008
- Windows 7

Hardware

- The installation works on 64-bit and 32-bit architectures. The provided 32-bit application works on 64-bit systems utilizing the WOW64 emulator, which is included on all Windows 64 bit versions.

Required Software

- Install all windows updates
- .NET 4
- SimSinter
- Microsoft SQL Compact 4.0
 - Available from the Microsoft Download Center
 - <http://www.microsoft.com/en-us/download/details.aspx?id=17876>

Optional Software

- AspenTech Engineering v8.4
 - Process Modeling (Aspen Plus)
- Process Systems Enterprise gPROMS (goRun_xml)

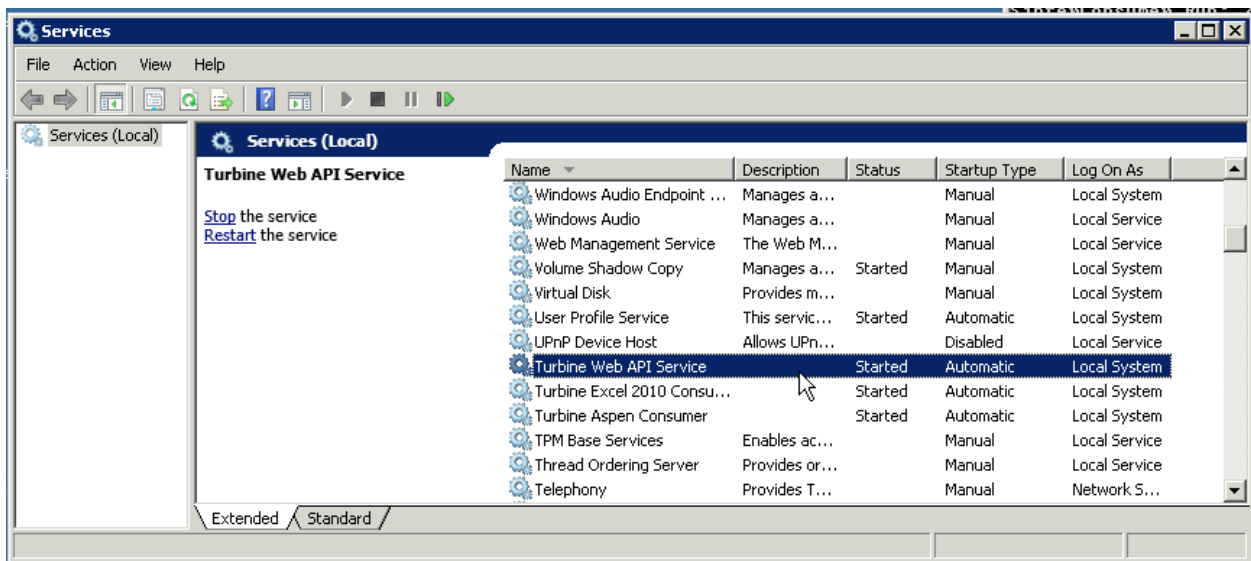
- MS Office Excel 2010
 - Required for the execution of Excel Spreadsheets

Client Software

- FOQUS (Contains TurbineClient, See FOQUS installation and use guide)
- TurbineClient (See TurbineClient installation and user guide)
- Web Browser

3. Installation

- Install prerequisites “SQL Compact 4.0”, “AspenTech Engineering v8.4”, “SimSinter”, and “MS Office Excel 2010” (optional).
- Download and double click on the “TurbineLite.msi”, you will need to accept the license and then a series of dialog boxes will walk you the installation process.
- Reboot, all “Turbine” Windows Services should be “started”.



4. Configuration

A. Web API

In order to use the Web API a rule to the firewall to allow through HTTP requests on port 8000.

- netsh http add urlacl url=http://localhost:8000/TurbineLite user=Administrator

5. Directory Setup

[NOTE: on 64 bit architecture the base directory is \Program Files (x86).]

Base Directory “\Program Files\Turbine\Lite”

Clients

Contains all DLL, executables, configurations, and PDB (debug) files for console applications and windows services.

Data

Contains working directories, files and data generated by consumer processes (Aspen,Excel) and the database file.

Logs

Contains the log files for windows services and the web application.

- **AspenSinterConsumerWindowsServiceLog.txt**
- **ExcelSinterConsumerWindowsServiceLog.txt**
- **TurbineWebAPILog.txt**

Web

Contains all DLL, executables, configurations, and PDB (debug) files for the web application.

6. Installation Tests

At this point install FOQUS and follow the FOQUS tutorial. If you experience problems with FOQUS interacting with TurbineLite you should complete the following tasks to diagnose the problem. Section “B” requires FOQUS is installed and has been initialized.

A. Turbine Web API

1. Navigate to “<https://localhost:8080/TurbineLite/session/>”
 - a. If using Internet Explorer, a sessions.json file will be downloaded. The resulting file will contain an empty list “[]”.
 - b. Firefox will display an empty list “[]”
 - c. Powershell you can use the “Invoke-WebRequest”, you will see a “[]” for content

```

Administrator: Windows PowerShell (5)
Windows PowerShell
Copyright (C) 2012 Microsoft Corporation. All rights reserved.

PS C:\Users\Administrator> Invoke-WebRequest http://localhost:8000/TurbineLite/session

StatusCode      : 200
StatusDescription : OK
Content         : 
RawContent      : HTTP/1.1 200 OK
                  Content-Length: 2
                  Content-Type: application/json; charset=utf-8
                  Date: Wed, 09 Jul 2014 19:08:15 GMT
                  Server: Microsoft-HTTPAPI/2.0

Forms           : 
Headers         : {[Content-Length, 2], [Content-Type, application/json; charset=utf-8], [Date, Wed, 09 Jul 2014 19:08:15 GMT], [Server, Microsoft-HTTPAPI/2.0]}
Images          : 
InputFields     : 
Links           : 
ParsedHtml      : mshtml.HTMLDocumentClass
RawContentLength : 2

PS C:\Users\Administrator>

```

2. A successful test means the Web API and Database are working correctly. If you receive a connection timeout check the Windows Service “Turbine WebAPI Service” status in “services.msc” or use the “sc” tool from a command prompt (DOS). The log contains useful information for diagnosing problems.

```

Administrator: Command Prompt
C:\Users\Administrator>sc query TurbineWebAPIService

SERVICE_NAME: TurbineWebAPIService
        TYPE               : 110  WIN32_OWN_PROCESS   (interactive)
        STATE                : 1      STOPPED
        WIN32_EXIT_CODE       : 0      (0x0)
        SERVICE_EXIT_CODE   : 0      (0x0)
        CHECKPOINT           : 0x0
        WAIT_HINT            : 0x0

C:\Users\Administrator>sc start TurbineWebAPIService

SERVICE_NAME: TurbineWebAPIService
        TYPE               : 110  WIN32_OWN_PROCESS   (interactive)
        STATE                : 2      START_PENDING
                        (NOT_STOPPABLE, NOT_PAUSABLE, IGNORES_SHUTDOWN)
        WIN32_EXIT_CODE       : 0      (0x0)
        SERVICE_EXIT_CODE   : 0      (0x0)
        CHECKPOINT           : 0x0
        WAIT_HINT            : 0x7d0
        PID                 : 3016
        FLAGS                 :

C:\Users\Administrator>more "%Program Files (x86)\Turbine\Lite\Logs\TurbineWebAPIService.log"
C:\Users\Administrator>more "%Program Files (x86)\Turbine\Lite\Logs\TurbineWebAPIService.log"
SelfManagedWebApplicationWindowsService: OnStart handler called
SelfManagedWebApplicationWindowsService: Application ProducerContext
SelfManagedWebApplicationWindowsService: Ignore Application ACM input entries already made
SelfManagedWebApplicationWindowsService: Application ProducerContext
SelfManagedWebApplicationWindowsService: Ignore Application AspenPlus input entries already made
SelfManagedWebApplicationWindowsService: Application ProducerContext
SelfManagedWebApplicationWindowsService: Ignore Application Excel input entries already made
SelfManagedWebApplicationWindowsService: OWNER test
SelfManagedWebApplicationWindowsService: Application ProducerContext
SelfManagedWebApplicationWindowsService: Ignore User entries already made
SelfManagedWebApplicationWindowsService: Service is ready

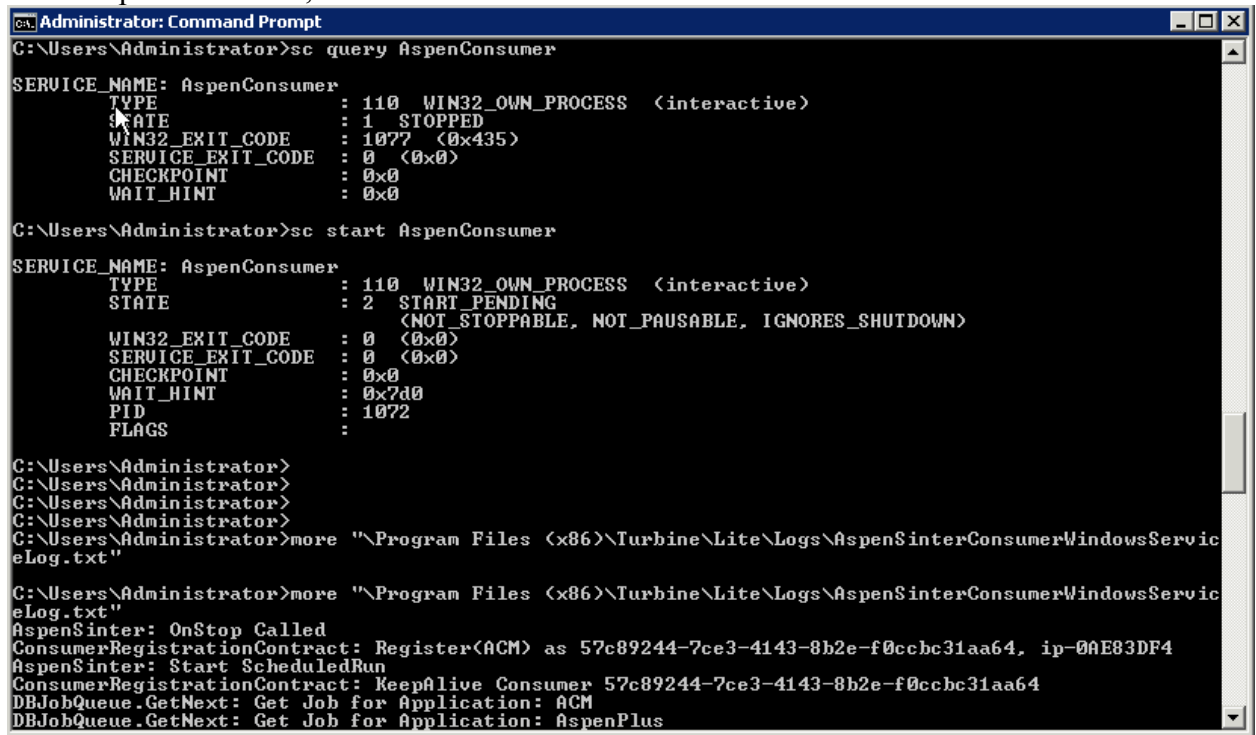
C:\Users\Administrator>

```

B. Turbine Aspen ACM

Make sure you have AspenTech process modeling (AspenPlus) v8.4 installed.

1. Check that the Windows Service “Turbine Aspen Consumer” is running. If it is “stopped”, try to “start” it. If the service fails to start something is wrong with your installation.
 - a. open “services”, “services.msc” or use the sc tool



```

Administrator: Command Prompt
C:\Users\Administrator>sc query AspenConsumer

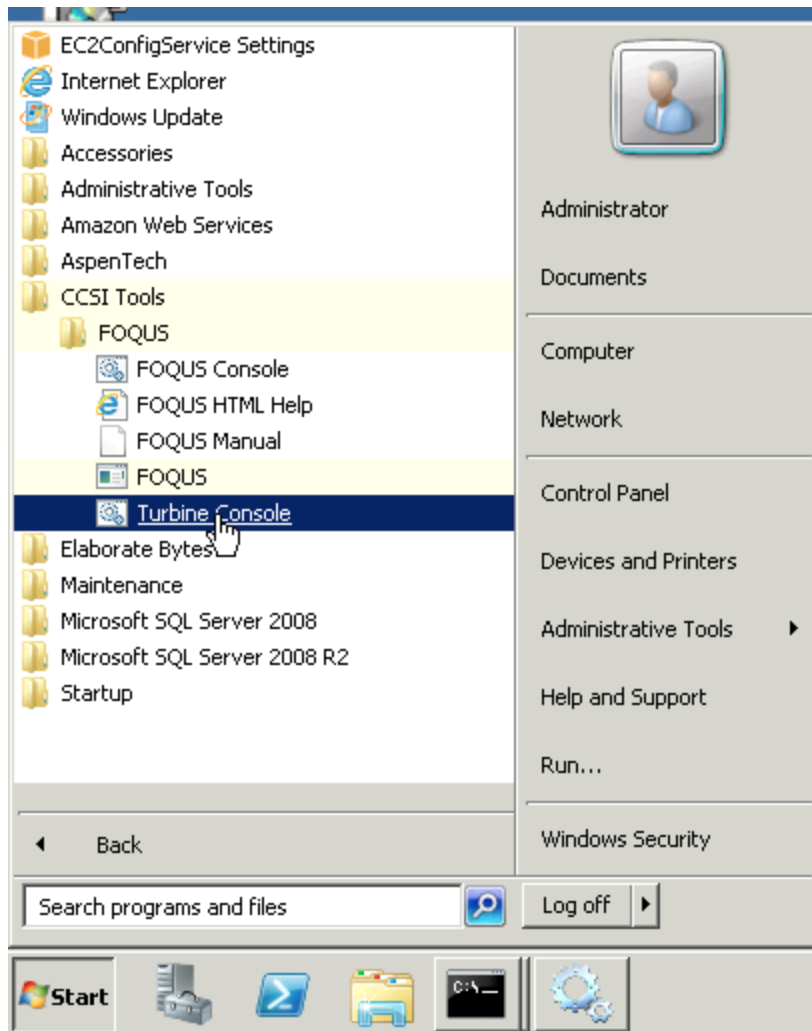
SERVICE_NAME: AspenConsumer
        TYPE               : 110  WIN32_OWN_PROCESS (interactive)
        STATE                : 1    STOPPED
        WIN32_EXIT_CODE       : 1077  (0x435)
        SERVICE_EXIT_CODE    : 0     (0x0)
        CHECKPOINT           : 0x0
        WAIT_HINT            : 0x0

C:\Users\Administrator>sc start AspenConsumer

SERVICE_NAME: AspenConsumer
        TYPE               : 110  WIN32_OWN_PROCESS (interactive)
        STATE                : 2    START_PENDING
                        (NOT_STOPPABLE, NOT_PAUSABLE, IGNORES_SHUTDOWN)
        WIN32_EXIT_CODE       : 0     (0x0)
        SERVICE_EXIT_CODE    : 0     (0x0)
        CHECKPOINT           : 0x0
        WAIT_HINT            : 0x7d0
        PID                 : 1072
        FLAGS                 :

C:\Users\Administrator>
C:\Users\Administrator>
C:\Users\Administrator>
C:\Users\Administrator>more "\Program Files (x86)\Turbine\Lite\Logs\AspenSinterConsumerWindowsServiceLog.txt"
C:\Users\Administrator>more "\Program Files (x86)\Turbine\Lite\Logs\AspenSinterConsumerWindowsServiceLog.txt"
AspenSinter: OnStop Called
ConsumerRegistrationContract: Register(ACM) as 57c89244-7ce3-4143-8b2e-f0ccbc31aa64, ip-0AE83DF4
AspenSinter: Start ScheduledRun
ConsumerRegistrationContract: KeepAlive Consumer 57c89244-7ce3-4143-8b2e-f0ccbc31aa64
DBJobQueue.GetNext: Get Job for Application: ACM
DBJobQueue.GetNext: Get Job for Application: AspenPlus
  
```

2. Open up the “Turbine Console” under the start menu.



3. Check that FOQUS files are available. In the example script below I am using "Desktop\foqus" as my FOQUS directory, you may have created it with a different path.


```

Administrator: Turbine Console
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\Administrator>set CONFIG="Desktop\foqus\turbineConfig\Default.cfg"

C:\Users\Administrator>more %CONFIG%
[Consumer]
url = http://localhost:8000/TurbineLite/consumer/

[Job]
url = http://localhost:8000/TurbineLite/job/

[Simulation]
url = http://localhost:8000/TurbineLite/simulation/

[Session]
url = http://localhost:8000/TurbineLite/session/

[Application]
url = http://localhost:8000/TurbineLite/application/

[Authentication]
username = None
password = None

C:\Users\Administrator>dir "C:\Program Files (x86)\foqus\foqus_2014.06.0\examples\Optimization\Model_Files"
Volume in drive C has no label.
Volume Serial Number is B845-1135

Directory of C:\Program Files (x86)\foqus\foqus_2014.06.0\examples\Optimization\Model_Files

07/09/2014  06:54 PM    <DIR>          -
07/09/2014  06:54 PM    <DIR>          -
07/09/2014  09:56 AM             15,859,033 BFBv5.2.3_new.acmf
07/09/2014  09:56 AM             78,648 BFBv5.2.3_new.xlsx
07/09/2014  09:56 AM              9,908 BFB_sinter_config.json
07/09/2014  09:56 AM              8,589 cost_sheet_sinter_config.json
                4 File(s)      15,956,178 bytes
                2 Dir(s)   13,011,877,888 bytes free

C:\Users\Administrator>

```

4. Upload a test ACM simulation (Optimization BFB)

```

Administrator: Turbine Console

C:\Users\Administrator>turbine_simulation_create BFB ACM %CONFIG%

C:\Users\Administrator>set SINTER_CONFIG="\Program Files (x86)\foqus\foqus_2014.06.0\examples\Optimization\Model_Files\BFB_sinter_config.json"

C:\Users\Administrator>set ACMF="\Program Files (x86)\foqus\foqus_2014.06.0\examples\Optimization\Model_Files\BFBv5.2.3_new.acmf"

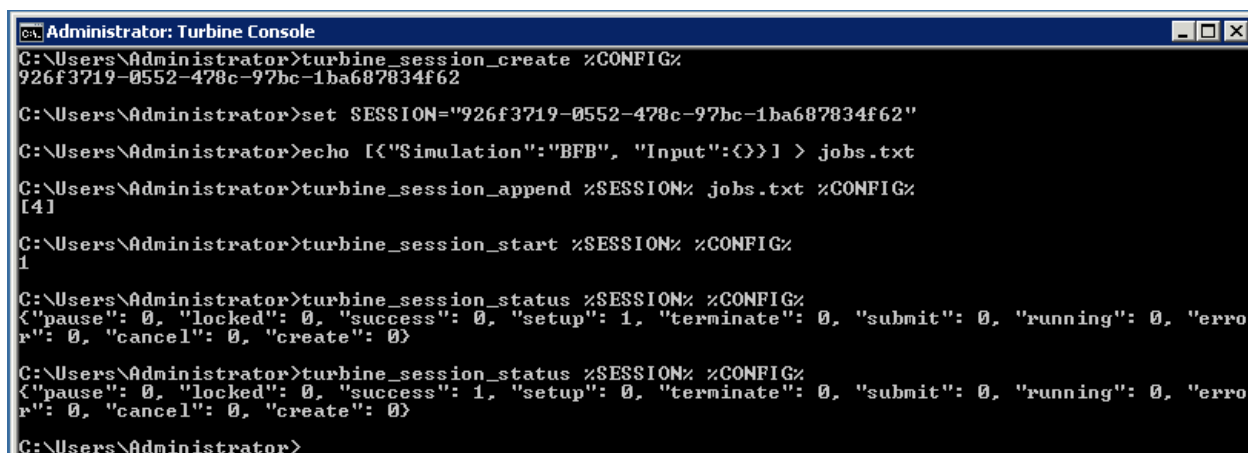
C:\Users\Administrator>turbine_simulation_update -r configuration BFB %SINTER_CONFIG% %CONFIG%

C:\Users\Administrator>turbine_simulation_update -r aspenfile BFB %ACMF% %CONFIG%

C:\Users\Administrator>

```

5. Create a “session”, add a job request and submit it to be run



```

Administrator: Turbine Console
C:\Users\Administrator>turbine_session_create %CONFIG%
926f3719-0552-478c-97bc-1ba687834f62
C:\Users\Administrator>set SESSION="926f3719-0552-478c-97bc-1ba687834f62"
C:\Users\Administrator>echo [{"Simulation":"BFB", "Input":{}}] > jobs.txt
C:\Users\Administrator>turbine_session_append %SESSION% jobs.txt %CONFIG%
[4]
C:\Users\Administrator>turbine_session_start %SESSION% %CONFIG%
1
C:\Users\Administrator>turbine_session_status %SESSION% %CONFIG%
{"pause": 0, "locked": 0, "success": 0, "setup": 1, "terminate": 0, "submit": 0, "running": 0, "error": 0, "cancel": 0, "create": 0}
C:\Users\Administrator>turbine_session_status %SESSION% %CONFIG%
{"pause": 0, "locked": 0, "success": 1, "setup": 0, "terminate": 0, "submit": 0, "running": 0, "error": 0, "cancel": 0, "create": 0}
C:\Users\Administrator>

```

It may take several minutes for the job to move from “submit” to “setup” to “running” to “success”. If the job ends in “error” check the log.

7. Uninstall

Control Panel

- a. under “Programs”, “uninstall a program” select “TurbineLite”.

8. Reporting Installation issues

ccsi-support@acceleratecarboncapture.org