Photorealistic Lights (IES)

a thomas mountainborn asset

1. Applying IES lights

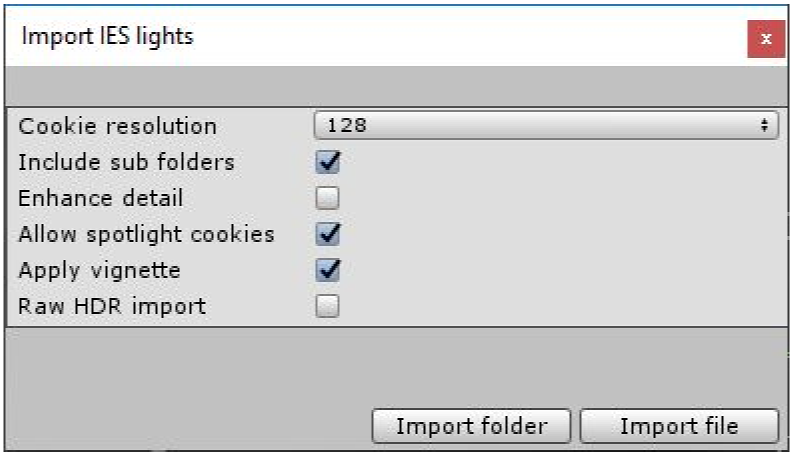
The IES data is imported as light cookies. The asset supports both point light and spotlight cookies. To apply a cookie, simply drag it into the “Cookie” slot of a light – 2D textures go onto spotlights, cubemaps onto point lights. You will find that a good number of samples came with the asset, so you can dig right in. Note that Unity as of yet does not support baked light cookies, so the light must be real time. If you require many real time lights, know that the deferred rendering path is far more suited for this.

An IES cookie will greatly change the way your light looks. Some IES lights will have asymmetry around the polar axis – be sure to give your lights a spin around the Y axis if you suspect this is the case. The preview in the inspector will give you a rough idea of where the light will shine. Play around with all the light’s settings to get the best result – distance to the wall, rotation, range, intensity and spot angle will all greatly impact the visuals.

You are likely to get the best results by disabling shadow casting on your lamp model. After all, the IES data is a direct measurement of how and where light comes out of a real lamp.

2. Importing IES lights in the editor

Many lamp manufacturers supply photometric measurements of their products for free on their site; normally these are used by architects in CAD packages, but video game developers have come to appreciate these just as much. This asset will import any .ies file you provide. You can also import entire folder hierarchies of .ies files if you downloaded a catalogue. Just go to **Assets > Import IES lights** in the Editor’s menu bar to get started. All imports are saved in IES/Imports. Existing imports will be replaced.



Cookie resolution 128

Include sub folders ☑

Enhance detail □

Allow spotlight cookies ☑

Apply vignette ☑

Raw HDR import □

2.1 Resolution

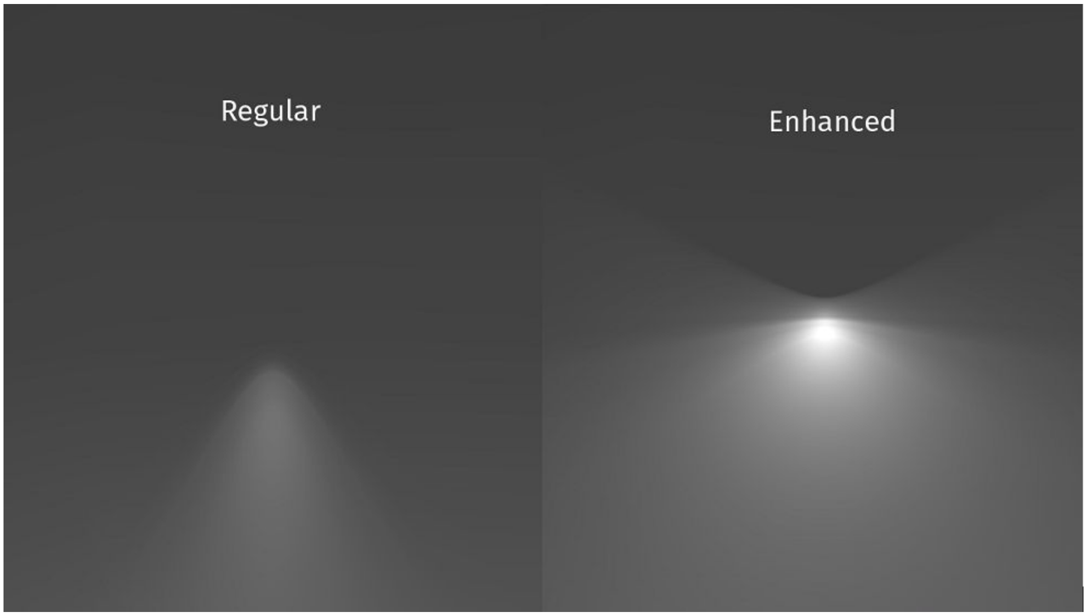
A cookie resolution of 64 will suffice for almost all IES lights, but 128 is defaulted to as a quality buffer – you can always drop down the resolution of a created cubemap in the inspector. Higher resolution options are available just in case a complex IES light looks a little blurry with 128 pixels.

2.2 Include sub folders

If you import a folder, all sub folders will also be imported if this is ticked. The folder hierarchy will be recreated inside IES/Imports. When importing several thousand .ies files, remember that each cookie requires storage space, scaling with the resolution you picked.

2.3 Enhance detail

This is a non-standard IES feature that will exaggerate the detail in the photometric measurements by reducing the impact of the brightest regions in the light. It can result in truly beautiful point light cookies – they won't match the actual lamp, but all is fair in love and video game development. To make it easy to tell them apart from regular imports, an [E] prefix is added to the cookie file name.



2.4 Allow spotlight cookies

When “Allow spotlight cookies” is enabled (it is by default), the asset will automatically try to create spotlight cookies whenever possible – i.e. when there is light only in one half of the .ies photometry. This allows you to use spotlights instead of point lights, saving greatly on rendering cost. Spotlight cookies are saved as “.asset” instead of as an image format, as this is necessary to set the correct import settings (clamp instead of repeat) right away.

Be aware that to create the cubemaps, a unit sphere is temporarily placed at the world origin on the Ignore Raycast layer. If you have any other objects on that layer at or very near the origin, disable them before importing IES files.

2.5 Apply vignette

When “Apply vignette” is enabled (it is by default), spotlight cookies will automatically be faded to black at the edges, i.e. a vignette is applied. This is done to prevent rendering glitches within Unity which occur when there are lit pixels at the edge of a spotlight cookie. The cookies also simply look better if they are faded out in a circular fashion. If you require the full lighting information all the way up to the edges though, disable this option.

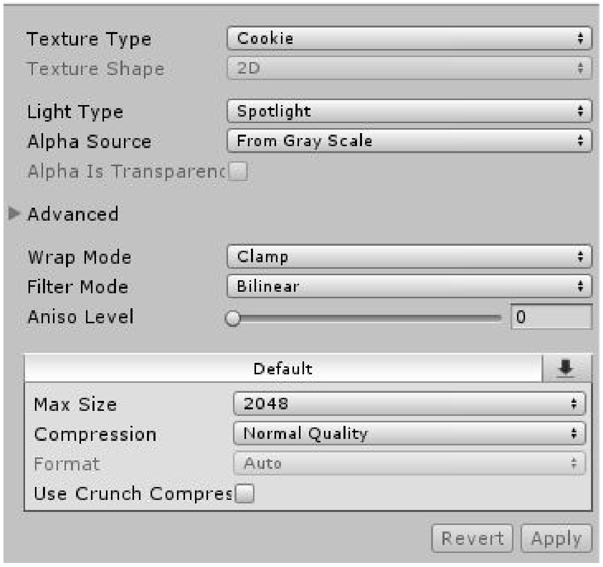
2.6 Raw HDR import

Regular imports created by this asset are directly usable within Unity – a vignette is optionally applied so there aren’t any hard cut offs in spotlights, and the values are normalized differently depending on whether or not enhanced mode is enabled. However, it may sometimes be desirable to have direct control over the imported data, for instance if you want to mimic a certain real life light as closely as possible.

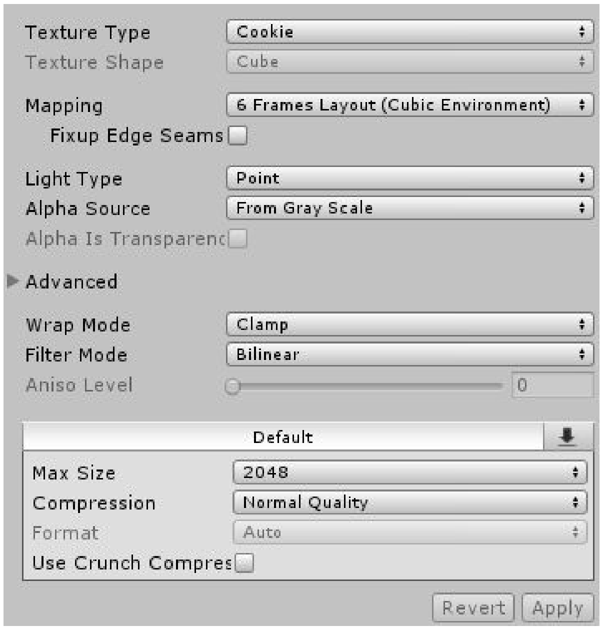
The “Raw HDR import” mode will create a .exr import of the given IES data, without applying a vignette. The .exr file contains HDR information, giving you the freedom to tonemap the values to your liking inside your preferred image editing program. In Photoshop for instance, you get a lot of tonemapping control when changing the image mode from 32 bit to 8 bit.

- Make sure the borders of spotlight cookies are entirely black, so there are no hard cut offs or graphical glitches.

- When importing the texture into Unity, set the texture type to Cookie, and pick spotlight or point light based on the import.
- Set the alpha source to gray scale.
- Make sure the wrap mode is set to clamp, to prevent graphics glitches by tiling cookie textures.
- On point light cookies, pick "6 frames layout" as the mapping type.



Texture Type: Cookie
Texture Shape: 2D
Light Type: Spotlight
Alpha Source: From Gray Scale
Alpha Is Transparenc ☐
▶ Advanced
Wrap Mode: Clamp
Filter Mode: Bilinear
Aniso Level: 0
Default
Max Size: 2048
Compression: Normal Quality
Format: Auto
Use Crunch Compres ☐



Texture Type: Cookie
Texture Shape: Cube
Mapping: 6 Frames Layout (Cubic Environment)
Fixup Edge Seams ☐
Light Type: Point
Alpha Source: From Gray Scale
Alpha Is Transparenc ☐
▶ Advanced
Wrap Mode: Clamp
Filter Mode: Bilinear
Aniso Level: 0
Default
Max Size: 2048
Compression: Normal Quality
Format: Auto
Use Crunch Compres ☐

3. Importing IES files at runtime

While the asset is mainly meant to be used in editor time, it is also possible to import IES files at runtime. The static IESLights.RuntimeIESImporter class exposes three methods to aid you in this endeavour.

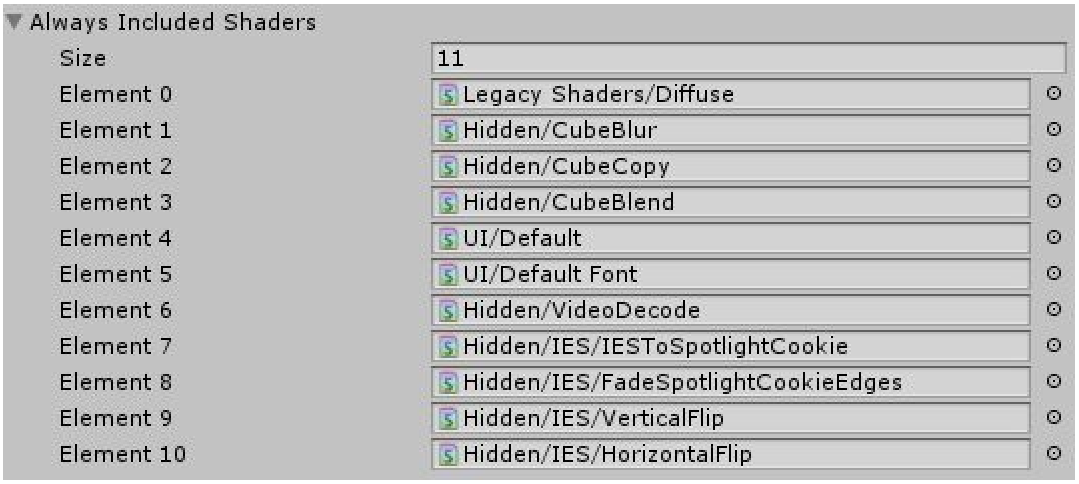
- RuntimeIESImporter.Import() takes the absolute path to the file (the .ies file does not need to be within StreamingAssets), and returns either a spotlight cookie or point light cookie, depening on the kind of luminaire the file describes.
- RuntimeIESImporter.ImportSpotlightCookie() will only return spotlight cookies - if the file can not be interpreted as a spotlight, it returns null.

- RuntimeIESImporter.ImportPointLightCookie() will only return point light cookies. If the file describes an automotive light, null is returned, as these are currently not represented as point lights.

Be aware that it is your responsibility to destroy the created texture once you no longer need it.

Important: To be able to import cookies at runtime in a build, you have to add the shaders which create them to the always included list. Under **Edit > Project Settings > Graphics**, add the following four shaders to the always included list:

- IESToSpotlightCookie
- FadeSpotlightCookieEdges
- VerticalFlip
- HorizontalFlip



▼ Always Included Shaders

Size	11
Element 0	Legacy Shaders/Diffuse
Element 1	Hidden/CubeBlur
Element 2	Hidden/CubeCopy
Element 3	Hidden/CubeBlend
Element 4	UI/Default
Element 5	UI/Default Font
Element 6	Hidden/VideoDecode
Element 7	Hidden/IES/IESToSpotlightCookie
Element 8	Hidden/IES/FadeSpotlightCookieEdges
Element 9	Hidden/IES/VerticalFlip
Element 10	Hidden/IES/HorizontalFlip

4. Getting more IES files

As mentioned, many lamp manufacturers will have a downloads section with .ies photometry files. For instance, Philips supplies them for (almost) every product, which are neatly divided into categories – useful if you are looking for a specific type. Just click through to a lamp, and head to its downloads section. You will find the .ies files in the Photometry / BIM section. Rovasi also offers neatly categorized .ies files – just click through to a product of your liking and you'll find a treasure trove of photometry data.

Other manufacturers supply their entire .ies catalogue as a single .zip, like Cooper. OMS provides a catalogue tool which exports .ies files. This is just the tip of the IES iceberg. Happy photometry hunting!