Quick Start Guide - The Iray Dome and the Use of HDRIs
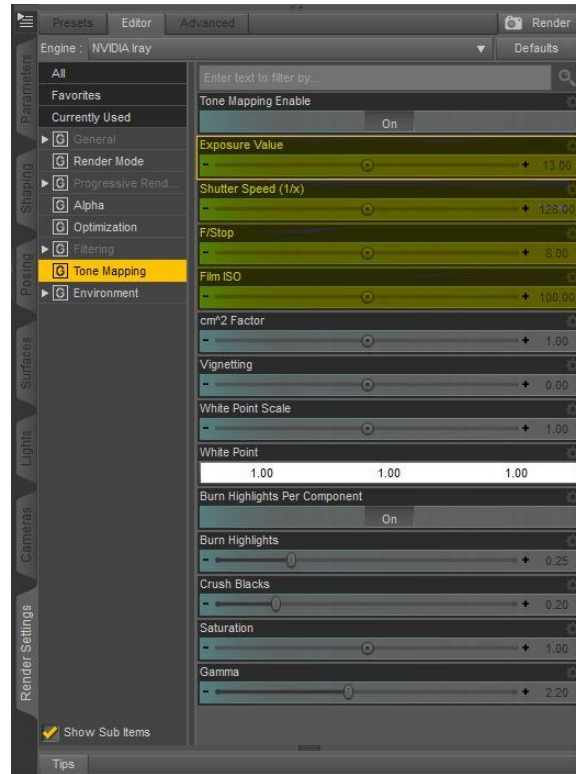
by Dumor3D

Note: This guide is included as a free supplement to the HDR sets by Dumor3D. The intent is to help you understand more about HDR images and their use in Iray. It is not required reading for using these sets but can help extend the usefulness of the sets.

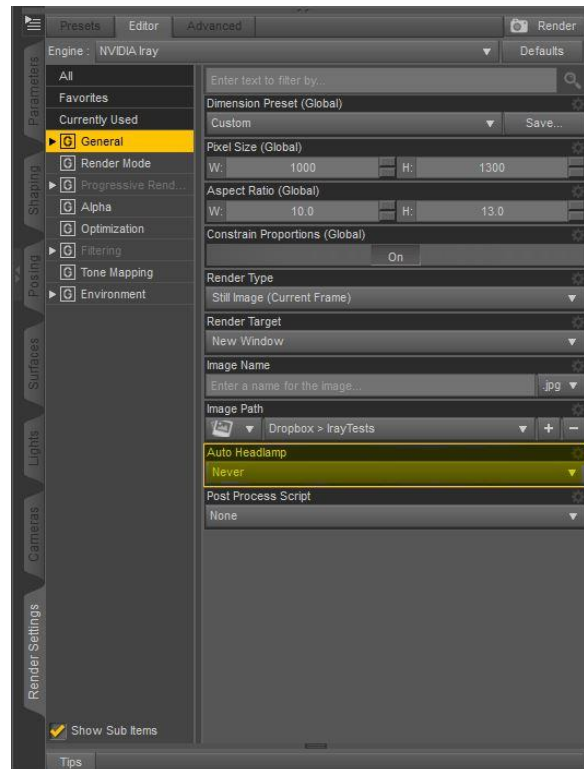Let's start by defining a few terms:

1. **HDRI** - **H**igh **D**ynamic **R**ange **I**mage. Many times simply called HDRs which is the file extension most used. The use of this term is very loosely used or one could even call it abused. HDR images in photography are create by stacking a set of over and or under exposed images along with a proper exposure creating a high dynamic range of exposure within a single image. This allows you to retain more detail in shadow areas and highlight areas, which is not possible with a single exposure. In practice, this creates the HDRI which is normally a 32bit image. It can contain more information than what can be seen on a computer screen, or what is seen in an 8bit jpg image. The abuse in my opinion, is that most HDR images are then processed, or tone mapped, and converted into an 8bit image so it can be viewed on a computer or printed. In this guide, when I refer to a HDR or HDRI, I'll be referring to a file that contains that extra dynamic range that you cannot see, but which is used by 3d programs. These images can contain huge exposure ranges, perhaps 20 or more EVs or camera stops of exposure. In a nutshell, if the sun is in the image, it can provide the sunlight for your scene. The sky, the ground and everything else in a HDRI for 3d programs will provide some light or dark influence on your 3d figures, props or environments. They can be used as your full lighting set for a scene or for lighting and a full dome background.

2. **Dome** - In Studio, under 'Render Settings', when the Iray Render engine is chosen, you will see an 'Environment' choice. It is here that we find the dome and it's options. This dome is an invisible sphere, much like a skydome you may have used in the past. We'll discuss some of the dome settings in a bit.

3. **Tone Mapping** - Again, in Studio, under 'Render Settings' when the Iray Render engine is chosen, we have a 'Tone Mapping' choice. Among other things, here we can set the exposure of our scene. Just like with a camera, we can adjust things like shutter speed, f/stop or film speed/ISO. We can use these values to overexpose, underexpose or properly expose the full scene. These will affect all lighting in the scene, both light from a HDRI and/or any other lights you may have in your scene.
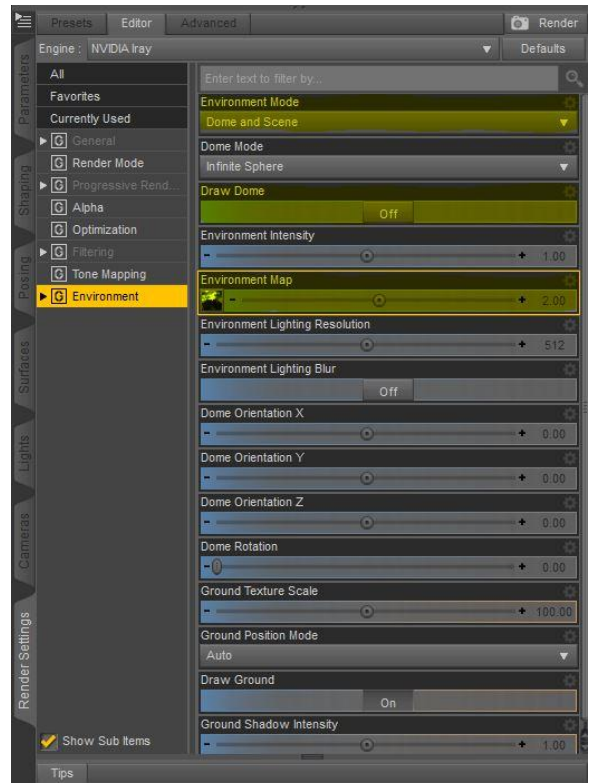
Let's Get Started

Since we'll be using a HDR for our lighting, let's make sure the camera headlamp is turned off. In 'Render Settings' under 'General', set 'Auto Headlamp' to 'Never'.
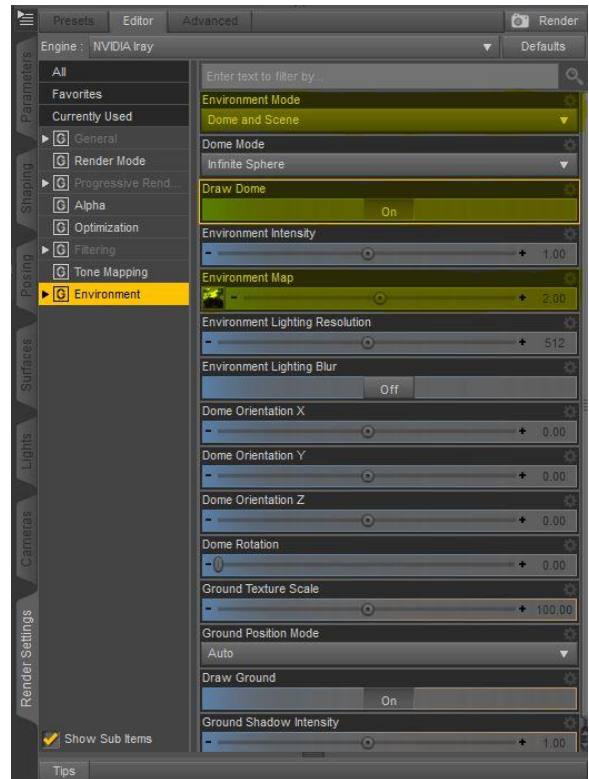
HDRIs can be used for lighting or for lighting and a background. Under 'Render Settings'->'Environment':

1. When used for **lighting only**, simply load your HDR image in the 'Environment Map'. The 'Environment Mode' should be set to 'Dome and Scene' and 'Draw Dome' should be set to 'Off'.

2. When used for **lighting and a background**, load your HDR image to the 'Environment Map'. 'Environment Mode' should be set to 'Dome and Scene' and 'Draw Dome' should be set to 'On'.

Take a Look!

To see the effects of adding your HDR, you will need to either run a render or set the viewport or aux viewport to NVIDIA® mode.

Remember, just like real lights, Iray lights do not shine through objects like walls, floors or ceilings. The light will transmit through openings or items like glass. If your scene is a room with no openings, you'll get only a black render when using a HDR Dome.
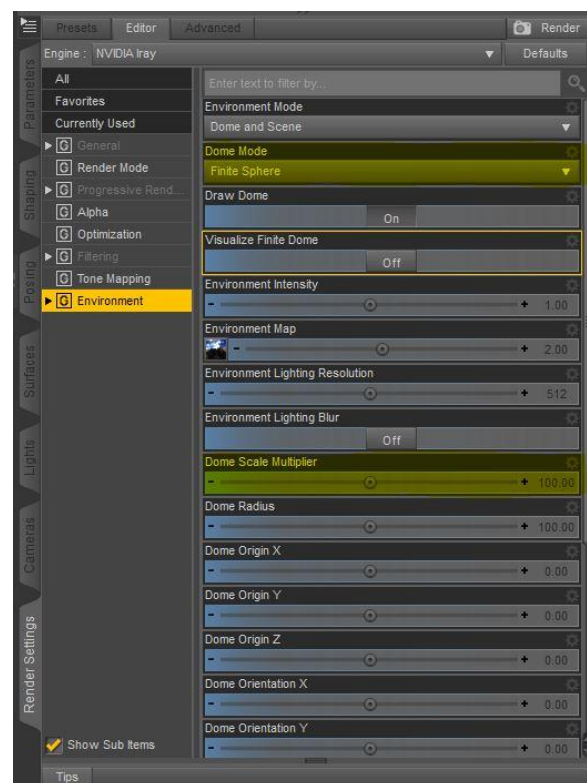
The use of an image in your background settings will not block any light. The HDR will light that background image. The two can be mixed.

If your scene is too bright or too dark to suit you, you can use one of the settings under Tone Mapping. If you are not a photographer, "Exposure Value" may be the easiest to understand. A lower number is less light, a higher number is more light. A change of just one number is a fairly large adjustment, equal to one stop on a camera. You can use any of the various options, Exposure Value, Shutter Speed, F/Stop or Film ISO, to obtain the same result.

Dome Adjustments - Lighting Plus Background

By default, the Dome is set to an 'Infinite Sphere'. It may sound a bit odd at first, but the size of the dome doesn't change the perceived size of the image applied to the dome, when your camera is centered. The image is actually infinitely large on a infinite dome, but since the dome is far away, the view of the image is far away and the view remains the same. If you are doing something like a single figure close-up or portrait shot, this can work fine. However, if you start to move the camera away from the figure, or move the figure away from the camera, the figure will appear to shrink in size since the dome image remains the same.

The effect is somewhat like moving around under the stars, something like an infinite dome. They look the same at your home as they do many miles away. In a planetarium, something like a finite dome, moving 20 or 30 feet will change your view of the stars. To deal with this, I suggest setting 'Dome Mode' to 'Finite Sphere' and set 'Dome Scale Multiplier' to around '10'.

If the scaling of your figure does not look correct, first try adjusting the 'Dome Scale Multiplier', up or down a bit, perhaps between 5 and 25. If the scaling still seems off, move your camera or figure in or out a bit. Also, you may wish to adjust the Camera focal length under Properties.

Other Environment Adjustments

Dome Rotation - This is useful for rotating the dome on the y-axis. If you are using your HDR as a background, it will rotate new views into your scene. When using HDRs, the lights are in the image, so rotating the dome is also rotating your HDR lighting, which you may want or may not.

Draw Ground - When draw ground is set to 'On', a 'shadow catcher' is placed at ground level within your dome. A shadow catcher is basically a flat plane that is invisible, except it will show shadows created by your HDR and/or other lighting, cast by figures, props and such. I find the default intensity to be very good, but do occasionally adjust it a bit.

Additional Lighting

 Additional lights can be used inside the dome. Photometric spotlight and pointlight, and /or emissive mesh lights all work great inside the dome.

A Bit More on HDR Images

We have so far talked about HDR images in 32bit HDR format. These should be equirectangular images, which have most of the time a 2:1 ratio and are a rectangle, not a circle. These images will look distorted as the center point of the top and bottom, is stretched across the full width of the image. When applied to the dome, the top and bottom of this image becomes the single point at the top and bottom of the sphere.

And even in the 3d HDR world, there is more than one type of HDR. Unfortunately you can't see this by looking at the image on your computer screen, but only when rendered in a program like Studio with Iray. I'll cover just a bit on these here, which may save you some frustration.

Most HDR images which are designed to be used as a background, are around 8000px wide X 4000px tall. This size works well with Studio as these images are normally around 100mb or 0.1GB. So, 0.1GB of your VRAM is used for the lights and the background environment which is very efficient.

There is also IBL (Image Based Lighting) and sIBL (smart IBL). sIBL sets normally also have a .ibl file, an .ENV.HDR lighting file and a .HDR file. These are combined into the lighting and scene in some 3d programs. The ibl file can contain additional lighting parameters, such as place a spot light at such and

such a location. sIBL sets are not supported by Iray, but some parts of them can be helpful. There is generally an env.hdr which is a very small sized HDR, which is extremely fuzzy looking, but does carry the light data from the original HDR. In Iray, these can be useful for lighting only HDRs. These sets often times have a hdr.hdr files in them, that is the full hdr scene file. However, the usefulness of these can vary widely. Since they are a part of a sIBL set, that ibl file might contain lighting data that makes the set function properly, instead of having the full lighting data in the HDR. We do not have a method for using that additional data. Since these 'sets' are not supported, the artist that created the set does not have his full work shown, unless you are using a render engine which can use sIBL sets.

High quality standalone HDR images designed for use in 3d programs are the type of HDRs you will want for good lighting and a good background.

Summary

Using HDR images for your lighting and backdrops normally is blazingly fast at render time. As you can see, setting up for using a HDRI is very easy. There are lots of other Render Settings that are fun to play with. The above settings I believe are the most important when getting started using HDRIs on the Iray Dome.

And yes, only 6 pages with lots of images! This really is not hard. Have fun with your rendering.