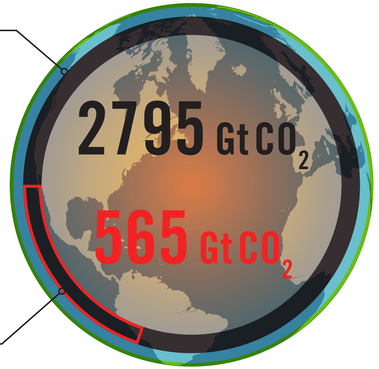
What would happen if we burned all of the fossil fuels that we can extract from the Earth?

The large black ring represents the proven extractable reserves of conventional fossil fuel that exist below the Earth's surface. If we burn it all, we will release 2,795 gigatonnes of CO_2 into the atmosphere.[1]



Breaking down the details: 65% of the 2,795 Gt of CO_2 emissions would come from proven reserves of coal, 22% from petroleum reserves, and 13% from natural gas deposits. This figure does not include unconventional sources such as those contained in tar sands and shale which would add as much as 1,000 Gt to the total.

If we have any chance at all of keeping global temperature increase from going above 2° Celsius, then we simply cannot release more than 565 gigatonnes of CO_2 into the atmosphere.[2] This means that we can only burn the amount of proven extractable reserves that is outlined in red. The rest must stay inside the Earth's surface, untouched and uncombusted.

Our current rate of global CO_2 emissions is 35.6 gigatonnes per year as of 2012.[3] At our current emissions growth rate of 3% per year, this means that we have only 12 years of fossil consumption remaining before we irrevocably surpass the 2° Celsius threshold.

If we instead take collective measures to reduce our emissions by 6% each year through conservation and a phased transition to clean and renewable sources of energy like solar, wind, hydro, and biofuels, then we could stretch out our remaining carbon budget over 40 years.

This would allow us to make a measured transition to clean energy by 2050 and avoid the worst effects of global climate change.

[1] Carbon Tracker Initiative (Potsdam Institute Methodology) via 350.org
[2] Intergovernmental Panel on Climate Change (IPCC)
[3] International Energy Agency (IEA)

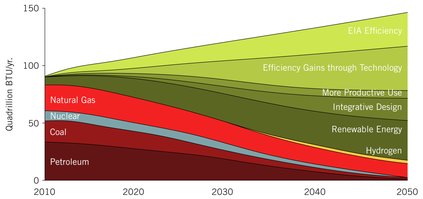
Here are some encouraging facts:

There are currently 20,000 MW of utility-scale solar installations being developed or under construction around the world. That's equal to 200 Shams-1 size projects. And this number doesn't include distributed (rooftop) installations.

On May 26, 2012 Germany produced 22 gigawatts per hour, or approximately 50% of German electricity demand from solar power alone. That's equal to 20 nuclear power stations at full capacity and is *more than the demand load of the entire UAE.*

The cost of renewable energy continues to decrease.
Grid parity (when the levelized cost of renewable energy is equal to that of fossil fuels) is likely to occur within the next decade.

It does take energy (and consequently CO_2 emissions) to manufacture solar panels and wind turbines. But the energy payback period is currently at 3 years for solar (PV) and 6 months for wind (HAWT), which means that after that time in operation, they begin to function as pure carbon offsets and become part of the solution to climate change.



Possible Global Energy Scenario 2010–2050

Avoid catastrophic climate change while maintaining consistent growth in productivity and achieving significant cost savings. The best part about renewable energy and efficiency is that once the infrastructure is in place, operational costs are minimal (energy from the sun and the wind is free).

From Rocky Mountain Institute (RMI). *Reinventing Fire* is published by Chelsea Green, © 2011.

Can the world make a transition to 100% clean renewable energy by 2050?

Yes. In fact, we have to if we are going to avoid catastrophic sea level rise, ocean acidification, severe drought and desertification, complete arctic ice melt, record-breaking weather events, and loss of global biodiversity through mass species extinctions.

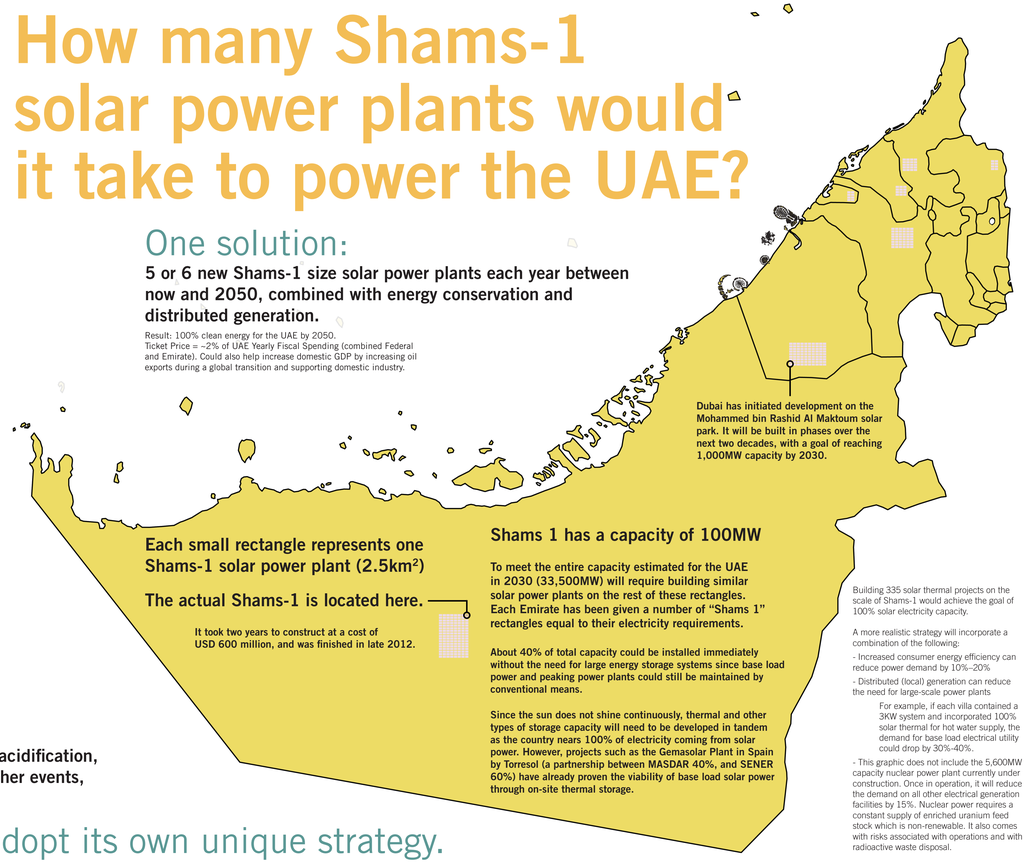
In order to get there, every nation must adopt its own unique strategy.

How many Shams-1 solar power plants would it take to power the UAE?

One solution:

5 or 6 new Shams-1 size solar power plants each year between now and 2050, combined with energy conservation and distributed generation.

Result: 100% clean energy for the UAE by 2050.
Ticket Price = ~2% of UAE Yearly Fiscal Spending (combined Federal and Emirate). Could also help increase domestic GDP by increasing oil exports during a global transition and supporting domestic industry.



Building 335 solar thermal projects on the scale of Shams-1 would achieve the goal of 100% solar electricity capacity.

A more realistic strategy will incorporate a combination of the following:

- Increased consumer energy efficiency can reduce power demand by 10%–20%
- Distributed (local) generation can reduce the need for large-scale power plants

  For example, if each villa contained a 3KW system and incorporated 100% solar thermal for hot water supply, the demand for base load electrical utility could drop by 30%–40%.
- This graphic does not include the 5,600MW capacity nuclear power plant currently under construction. Once in operation, it will reduce the demand on all other electrical generation facilities by 15%. Nuclear power requires a constant supply of enriched uranium feed stock which is non-renewable. It also comes with risks associated with operations and with radioactive waste disposal.