

### The Carbon Underground Universe

The reserves data used to create The Carbon Underground 200 come from FFI's master database of over 750 current and past publicly-listed companies. Each company is researched and validated for changes in reserves, company structure and ownership, exchange listings, and share class issues. Includes companies reporting production but not reporting reserves as well as reserves-reporting companies that do not appear on The Carbon Underground 200 at present. FFI provides custom rankings and analyses based on client-defined criteria as well as the option to license the full universe.

### Subscription Services

FFI offers annual subscriptions to The Carbon Underground family of rankings: The Carbon Underground 200™, The Tar Sands 20™, The Coal 100, The Oil and Gas 100, and The Carbon Underground Universe of all companies. For each of these, we provide:

- Annual subscriptions for use with investment strategies and for in-depth research
- Quarterly updates
- Security Identifiers
- Web, FTP, and email delivery
- One-time snapshots for ad hoc research
- Historically consistent data starting from 2004 for use in backtesting

### Straightforward Portfolio Screening

The Carbon Underground rankings allow asset owners and asset managers to create a straightforward screening process for their portfolios, with powerful benefits:

- Clear, transparent definition of fossil-free
- Dynamic, continually researched and regularly updated
- Can customize by reserve-type and geography
- Easily integrated to maintain all the benefits of current asset management strategies
- Easy to understand and communicate

The Carbon Underground 200™ identifies the 100 largest public coal and 100 largest public oil and gas reserve owners based on the potential CO<sub>2</sub> emissions of their reported reserves.

### From Climate Risk to Portfolio Risk

Covering 97% of reported fossil fuel reserves of listed companies globally, The Carbon Underground 200 2015 companies currently hold greater than four times more in reserves than their share of what can safely be burned in order to stay below the 2° Celsius threshold\*, an amount commonly referred to as a "carbon budget." This excess implies that in order to live within our carbon budget, we must leave 80% of the reported coal, oil, and gas reserves of the 200 companies underground.

### Relative Rankings of The Carbon Underground 200

1 Coal India 57.72 Gt	3 Adani 25.38 Gt	4 Shanxi Coking 18.44 Gt	5 Anglo American 13.49 Gt	Coal Top 26 - 100 90 Gt CO <sub>2</sub>	1 Gazprom 43.92 Gt	2 Rosneft 13.22 Gt	
Coal Top 10 212 Gt CO <sub>2</sub>					Oil & Gas Top 10 106 Gt CO <sub>2</sub>		
2 China Shenhua 36.81 Gt	6 BHP Billiton 12.35 Gt	8 Datang Intl 12.21 Gt	9 China Coal 12.10 Gt		3 PetroChina 8.59 Gt	5 Lukoil 6.99 Gt	8 Royal Dutch Shell
Coal Top 11 - 25 100 Gt CO <sub>2</sub>					4 ExxonMobil 8.22 Gt	6 BP 6.72 Gt	9 Chevron 4.07 Gt
					7 Petrobras 5.43 Gt	10 Novatek	
					Oil & Gas Top 11 - 25 26 Gt CO <sub>2</sub>		Oil & Gas Top 26 - 100 22 Gt CO <sub>2</sub>
Fossil Free Indexes, LLC							

The current market value of companies holding large fossil fuel reserves reflects the assumption that these reserves are all going to be exploited and burned. If one considers, however, that the notion of burning all current reserves is inconsistent with the imperative to limit greenhouse gas emissions, we can begin to see that in fact, we may be experiencing a "carbon bubble."

Cheaper and cleaner alternative energy sources, changing legislation, environmental controls, and public pressure put these "unburnable" reserves at risk of losing their value and becoming "stranded assets."

### Fossil Free Investment Strategies and Research

Recognized by both environmental and financial communities, The Carbon Underground 200™ list is a valuable and straightforward screening tool. Institutional investors, pension funds, family offices, endowments, foundations, NGOs, and other investment professionals who wish to integrate carbon risk management and/or carbon responsible investing into their decision processes can:

- Target and evaluate companies for inclusion/exclusion based on reserves holdings
- Create new investment strategies and enhance existing ones based on the list
- Assess trends in the carbon concentration of their portfolios by evaluating embedded emissions in their past portfolios

\* The 2° C threshold was established in the Intergovernmental Panel on Climate Change (IPCC) Second Assessment Report. It is generally accepted that this temperature threshold will help us to avoid the most catastrophic effects of climate change.

### Custom Research and Consulting Services

FFI offers customized research and consulting services to undertake more complex analyses of fossil fuel companies and their reserve exposures. These include customized rankings based on additional factors such as fuel type (e.g., different coal types), production data, and exposure to commodity prices. FFI works with clients to create customized investment screens that incorporate additional factors, including combining potential CO<sub>2</sub> emissions based on reserves with current CO<sub>2</sub> emissions to extend carbon re-weightings to sectors beyond energy, and incorporating other variables related to climate risk and stranded assets, as defined in partnership with clients. FFI also uses The Carbon Underground for in-depth research and thought leadership projects for investment managers, asset owners, non-governmental organizations, and other institutions. To provide industry-leading current emissions data and analysis we partner with South Pole Group, a global leader in sustainability solutions and carbon footprinting.

### About FFI

FFI provides benchmarks, research, and investment solutions that support carbon-responsible investing. FFI indexes and rankings are licensed for funds, ETFs, and separate accounts, as the basis for investable products and strategies.

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The Carbon Underground Tar Sands 20 is a ranking of the 20 public companies with the highest potential CO<sub>2</sub> emissions embedded in their tar sands reserves. For 2015, the companies on the Tar Sands 20 list are estimated to account for over 90% of total tar sands reserves held by public companies.

### Beyond Reserves-based Emissions

Like The Carbon Underground 200, the Tar Sands 20 is created using data from The Carbon Underground Universe of companies. Because the potential reserves-based emissions methodology does not account for other “life-cycle” emissions such as extraction, transport, refining and distribution and because oil extracted from tar sands is the most labor- and energy-intensive type of oil to refine, we have packaged this set of data focused on tar sands reserves alone.

Projects to extract tar sands are more expensive than many oil projects and consequently more at risk of becoming stranded.

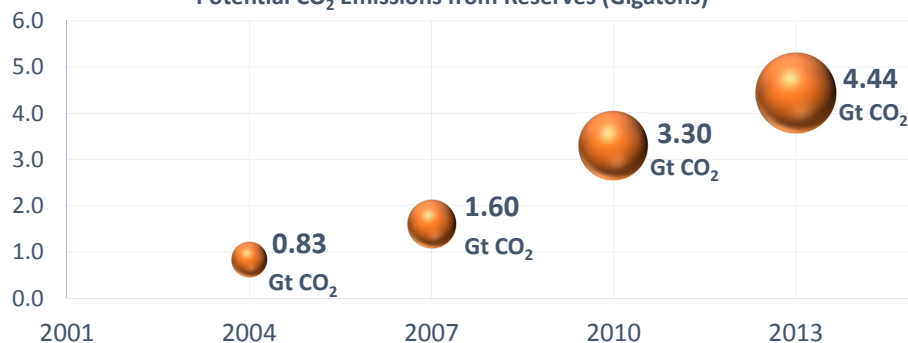
### Fossil Free Investment Strategies and Research

The Carbon Underground Tar Sands 20 is a unique and effective tool for those wishing to manage carbon risk embedded in proven unconventional tar sands reserves. Opposed for their huge environmental footprint and resource-intensive production, these reserves generate a premium of CO<sub>2</sub> emissions over conventionally produced oil because of the energy required to extract and process them.

Institutional investors, pension funds, family offices, endowments, foundations, NGOs, and other investment professionals who wish to manage carbon risk in their portfolios and/or integrate carbon-responsible investing into their decision processes can:

- Isolate some of the most environmentally harmful reserves
- Combine with The Carbon Underground Coal 100 to target the most costly and carbon-intensive fossil fuels first
- Use the Tar Sands 20 as a bridge to full divestment
- Assess portfolio exposure to carbon assets with a higher risk of stranding
- Create investment strategies based on unconventional reserves ownership

**The Carbon Underground Tar Sands 20  
Potential CO<sub>2</sub> Emissions from Reserves (Gigatons)**



The growth rate of potential CO<sub>2</sub> emissions from tar sands has far exceeded the growth rate of potential oil and gas emissions overall. Oil price volatility, government carbon regulations, and environmental activism force these unconventional high cost assets into the highest risk for becoming stranded.