

Investment Summary

I am initiating a Buy recommendation for Advanced Emissions Solutions Incorporated. The one-year price target for ADES is \$18.59, which represents a 25.28% increase over its current price of \$13.89. ADES is a microcap firm in the Industrial Goods sector, and it is considerably undervalued compared to other firms in its sector.

Investment Thesis

- **Value Investment:** ADES is significantly cheaper than its comparable companies at a P/E of 7.58, pays out a healthy 7.32% dividend yield, and has an impressive 37.18% return on equity.
- **Dual Investment in Energy and Industrials:** Though ADES is in the Industrial sector, its investments in Tinnium allow for a diversification of sector investment in one stock.
- **Environmental Regulations:** Given ramping political pressure on politicians to positively impact the environment, ADES's business model may flourish in the coming future. The growth of regulations on the energy and industrial goods sectors will allow ADES to enhance its bottom line. An investment in ADES is a vehicle of investing in future environmental regulation, should more occur looking forward.
- **Short-Term:** In the short term, ADES will continue to generate substantial revenues from its Refined Coal business segment. ADES's stock price will also grow due to its continued share buyback program, with over \$5 million worth of stock still allotted for repurchase by the Board of Directors in 2019.
- **Long-Term:** In the long term, ADES will utilize its recent acquisition of Carbon Solutions to further solidify itself in the growing activated carbon market. As environmental regulations become more complex and intricate, the activated carbon market will

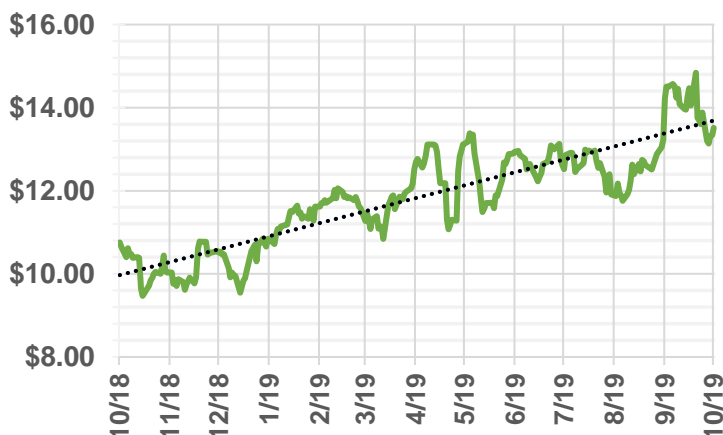
| ADES | |
|------------------|---------|
| Ticker (NASDAQ) | ADES |
| Market Cap | 250M |
| P/E | 7.58 |
| Return on Equity | 37.18% |
| Dividend Yield | 7.32% |
| Beta | 1.2 |
| Current Price | \$13.89 |
| Target Price | \$18.59 |
| Target Growth | 26.52% |

become more lucrative. ADES will also utilize tax credit carryforwards to reduce its tax burden in years where its financial state may suffer.

Business Description

ADES is a Delaware based corporation founded in 1996, with headquarters in Highland Ranch, Colorado. The firm is a holding company of ADA-ES, ADA Carbon Solutions and Tinnium Group, with ADA-ES being the parent firm and Tinnium being an equity investment. The firm provides pollution treatments for coal-fired power generators and more recently water purification services. The

ADES One-Year Performance



firm's primary business segments are Power Generation & Industrials ("PGI") and Refined Coal ("RC"). Some technology from the PGI segment is used in the Refined Coal segment.

(1) Power Generation and Industrials

ADES's PGI segment offers technology and consulting services for coal-fired power generators and other industrial companies to meet environmental regulations. ADES offers technology to reduce emissions from mercury and other dangerous gasses that the United States Government regulates. Industrial providers of coal-fired energy are required to control the amount of mercury and other dangerous gasses they emit due to the Material and Air Toxic Standards ("MATS"), which are United States regulations put into effect in late 2011. These regulations are a marketplace for technology and consulting businesses that can assist the coal-fired power generators and other industrial companies in meeting said regulations. As environmental regulations ramp up, ADES's business will grow.

Its primary technologies are CyClean™ and its M-45™ line of products. CyClean™ enhances combustion and reduces emissions of both nitrogen oxides and mercury produced from burning coal in cyclone boilers. Its M-45™ and M-45-PC™ technology treat coal pre-combustion, designed to control emissions from circulating fluidized bed boilers and pulverized coal boilers, respectively. Both lines of technology are currently patented. Their first patent was filed in mid-2001, expiring in 2021. Their latest patents were filed in 2018, expiring in 2038. Their core technology patents are not currently in danger of patent expiry.

(2) Refined Coal

ADES has 42.5% ownership in Tinium Group, an unconsolidated entity, and 50% ownership in Tinium Services. Tinium Group has, over the last ten years, built, serviced and leased or sold refined coal facilities. Facilities that have been leased or sold are called "invested". These facilities are designed to meet environmental regulations like MATS. Tinium Services maintains these refined coal facilities.

ADA-ES licenses its technologies like CyClean™ and M-45™ to Tinium so that they can ensure that the coal produced from said facilities meets environmental regulations, and ADES generates revenue from licensing royalties as a result of this agreement. Tinium's revenues are driven by the lease agreements and the production of refined coal.

Refined coal facilities that hold up to the government's standards (list the standards) qualify for production tax credits. These tax credits are incredibly valuable: every ton of refined coal produced grants \$7.137 in tax credits (in 2019). These tax credits rise with inflation and last for up to 7 years after generation. Tinium's primary business involves leasing or selling these refined coal facilities to tax equity investors. These investors receive the production tax credits involved with producing refined coal and will pay top dollar to reduce their tax burden.

ADES has generated over 100 million dollars of tax credit carryforwards while they were operating the refined coal facilities themselves. Throughout 2019, 4 additional facilities have become invested, demonstrating that tax equity investment opportunities are still viable this late into the program. 5 facilities remain for Tinium to lease or sell.

| Invested RC Facilities (2018) | |
|------------------------------------|---------------|
| Number Leased | 19 |
| Tax Credit / Ton | \$7.03 |
| Tons of RC Produced | 59,737,000 |
| Leased Tax Credits | \$419,951,110 |
| Tax Credits Generated Per Investor | \$22,102,690 |

While the tax credits themselves expire in a longer term, in December 2021, the program that allows for these production tax credits to be generated will end. This may result in a significant loss for Tinnuum, as tax equity investors will no longer be interested in leasing or buying said facilities. It is in Tinnuum's best interest to sell off their remaining facilities. However, refined coal production is increasing in market share and will likely continue to do so in the short term, and Tinnuum Services will still generate revenues from maintaining the invested facilities.

Industry Analysis

The pool of firms to compare ADES to is relatively small due to its unique business model, but among those comparable firms ADES is inexpensive. An investment in ADES would be an investment vehicle for future environmental regulations, and with increasing pressure on politicians in the United States to address anthropogenic climate change, the business has significant growth potential.

(1) Activated Carbon

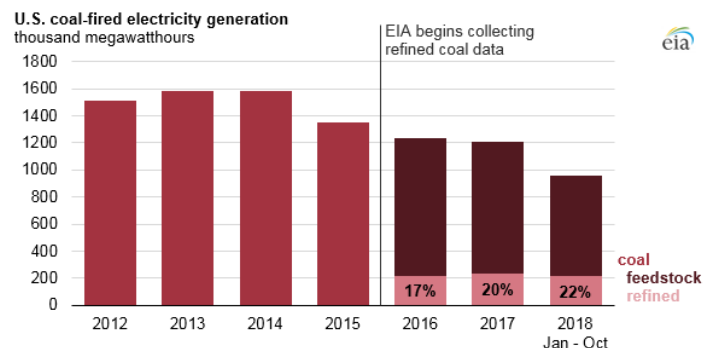
The Activated Carbon industry, though relatively small, is growing at a substantial clip. The Global Activated Carbon Market was worth \$4.12 billion in 2017 and is expected to reach \$14.21 billion by 2026. Expected points of growth are in both potable water purification and in sewage treatment plants. Activated carbon will absorb contaminants from the water in a safe way and it is relatively cheap. ADES uses lignite coal to create activated carbon and it owns a lignite mine in order to produce said lignite.

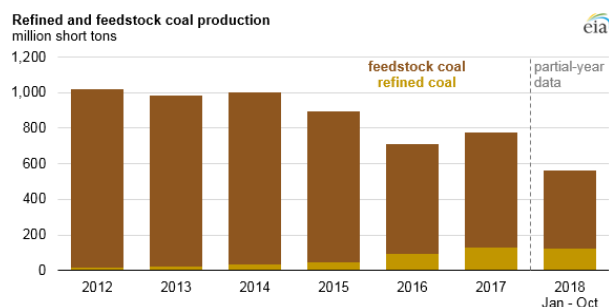
ADES's acquisition of Carbon Solutions will allow them to expand further into the market via their lignite coal mine and processes of said activated carbon.

(2) Refined Coal

As reported by the Energy Information Administration, United States coal-fired electricity generation is being represented more significantly by refined coal year-over-year. From the period between 2016 and 2018, refined coal grew from 17% of all coal-fired electricity generation to 22%. Refined coal production has also grown from near zero short tons produced in 2012 to over 161 million short tons produced in 2018.

Coal is a domestic, cheap and reliable source of energy that should not be underestimated given the fixed costs and variability of renewable resources like solar and wind energy. Solar and wind energy production are dependent on the weather and climate; coal can be burned anytime, anywhere.





Lignite coal (the primary type of coal used by ADES) is the second cheapest form of coal at \$19.51 per short ton, trailing behind subbituminous coal at \$14.29 per short ton. For areas where lignite coal is present to be able to generate energy, they will need ADES's technology to improve its efficiency. Lignite is very wet and inefficient before refinery, but post-refinery it becomes far more energy efficient, allowing geographic expansion for the coal industry.

(3) Sector Analysis

The Mercury Air and Toxics Standards save the United States an estimated \$90 billion a year in health care costs, saving thousands of lives. These standards also cost the coal-fired and oil-fired power industry \$7.4 to \$9.6 billion a year.

To meet these standards, energy sources must meet certain specific requirements. Refined coal facilities must be able to demonstrate to engineers that they reduce nitrogen oxide emissions by 20% and mercury or sulfur dioxide emissions by 40%, compared to regular feedstock coal. These regulations are not easy to meet which contributes greatly to ADES's market share in the refined coal industry and in the potable water industry.

| Health Effect | Cases Avoided |
|------------------------------------|---------------|
| Premature death | 4,200-11,000 |
| Chronic bronchitis | 2,800 |
| Heart attacks | 4,700 |
| Asthma attacks | 130,000 |
| Hospital and emergency room visits | 5,700 |
| Restricted activity days | 3,200,000 |

| Firm | MKT Cap (millions) | P/E | P/B | Dividend Yield | Return on Equity |
|------------------------|--------------------|--------|-------|----------------|------------------|
| ADES | 250 | 7.58X | 2.33X | 7.40% | 37.18% |
| CECO | 233 | 11.30X | 1.3X | - | (2.46%) |
| Energy Recovery | 598 | 39.21X | 4.05X | - | 11.70% |
| Heritage Crystal Clean | 596 | 45.16X | 2.31X | - | 5.49% |
| Evoqua | 1800 | 26.30X | 5.16X | - | (4.10%) |
| Cabot | 2571 | 12.27X | 2.35X | 3.28% | 19.72% |

(4) Comparable Companies

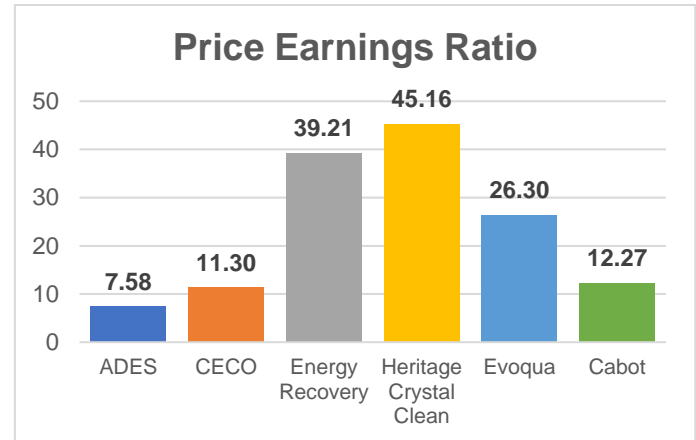
ADES is a unique firm due to the combination of its revenue streams and business segments. Assembly of a list of comparable companies is additionally problematic due to many Pollution Controls companies not being publicly traded. My list of comparable companies tackles the goal of *investing in regulations* – these companies all generate revenues due to environmental regulations.

(i) Dividends

A trademark of a great value stock is the fact that it pays out dividends, and ADES pays out an annual yield of 7.32%. This has historically translated to about \$1/share per year, every year. The sole other firm paying out dividends is Cabot Corporation (CBT), ADES's biggest competitor in the activated carbon market, with yields less than half of ADES's.

(ii) Price/Earnings Ratio

With the average price/earnings ratio of this set of stocks at 23.60X, ADES is 3.18 times as cheap as the average. The average P/E ratio of the NASDAQ exchange is currently 20.38X and the average P/E of the XLI Industrial Sector SPDR fund is 17.96X. In all areas, ADES is cheaper than comparable firm with a P/E of 7.58X.



(iii) Return on Equity

ADES reports a phenomenal ROE of 38.70%, almost double that of its biggest competitor, Cabot Corporation (at 19.72%).

(iv) EV/EBITDA

EV/EBITDA calculations for ADES are misleading because of the accounting methodology used to calculate EBITDA. Given that equity method revenues are listed under other income on the income statement, it must be removed when calculating EBITDA. This heavily skews ADES's EBITDA lower, making its EV/EBITDA astronomically high in comparison to other firms. For this reason, EV/EBITDA has not been listed as a multiple used in analyzing the firm.

Financial Analysis

(1) Stock Price

Year-to-date, ADES's stock price has grown from \$10.55 to \$13.89, a growth of 24%. This reaction is possibly due to the firm's recent leverage and acquisition of Carbon Solutions, though it could also be normal market movement. ADES's P/E of 7.58X and P/B of 2.33X indicate this stock is potentially undervalued compared to the overall market.

(2) Income Statement

Revenues are growing for Tinum Group at a rate of +264.50% year-over year. Revenue growth in recent quarters is due to their recent acquisition of Carbon Solutions, LLC. The firm has historically struggled to generate a positive operating margin but in Q3 2018, Q4 2018, and Q1 2019 they have succeeded. Revenues are driven by consumables (the sale of activated carbon), and the licensing of their technology in exchange for royalties.

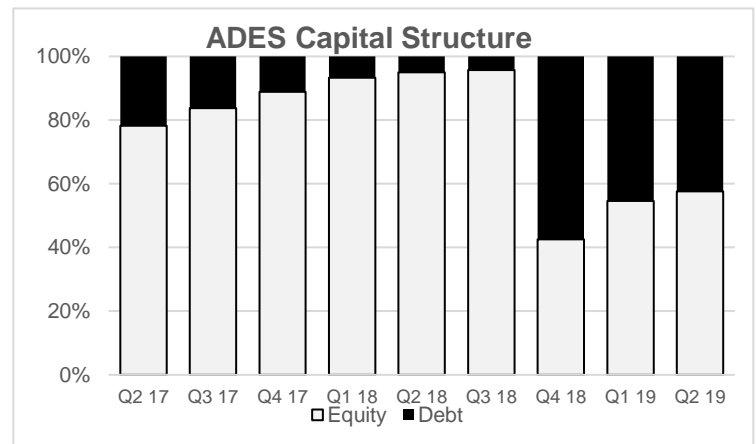
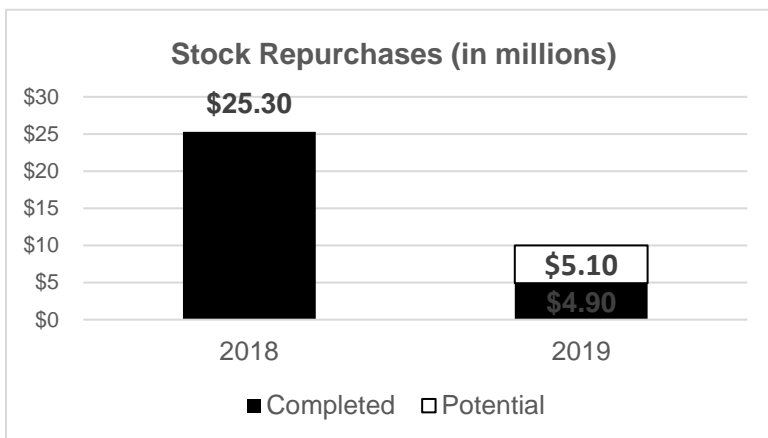
Earnings from equity investments have increased in Q1 2019 and Q2 2019 relative to those quarters in 2018. This increase is due to Tinum's recent sales and leases of their remaining refined coal facilities. Drivers of this income segment are primarily tax equity investors. Earnings from equity investments represented \$54.2 million in 2018, over double the revenues of the firm. Given Tinum's recent facility investments, these earnings should increase or stay stable over the next two years.

Tax burdens can be reduced significantly by ADES due to its tax credit carryforwards received when it was operating refined coal facilities. ADES has generated \$104 million in tax credit carryforwards and can continue to use them in situations where its income may be negatively affected by tax.

(3) Capital Structure

In Q4 2018, ADES acquired Carbon Solutions, LLC for \$75 million, a leading manufacturer and seller of activated carbon, material that is used to reduce emissions for coal-fired power generators and reduce pollution in water. The company issued \$70 million in debt to finance this acquisition, which is a significant amount of leverage for a company with \$250 million in market capitalization. Included with this acquisition was a lignite coal mine in Louisiana. Lignite is a primary ingredient in powdered activated carbon, which can be used to treat coal, water and other consumables. This acquisition represents a significant growth opportunity for ADES to streamline its supply chain and potential for investment opportunities given ADES's recent leverage. In addition, ADES's WACC is 5.80%, meaning it can easily lever itself up more in the future given its relatively low cost of capital.

ADES also recently repurchased \$25.3 million in stock in 2018 and \$4.9 million in stock in the first two quarters of 2019. ADES has a remaining allowance of \$5.1 million stock repurchases for the year of 2019 permitted by its Board of Directors.



Valuation

In order to hedge against the potential risks associated with the next two years, a conservative approach to valuing ADES has been taken. My valuation of the firm is a result of a blend of the Dividend Discount Model, the Free Cash Flow Discount model and the Free Cash Flow to Equity Discount Model. Assuming the loss of Tinuum's ability to create production tax credits significantly harms ADES, I have created two separate models to value the company.

| Model 1 (0% -> 5%) | | Weight |
|--------------------|----------------|-------------|
| DDM | \$21.54 | 47.5% |
| FCF | \$21.49 | 47.5% |
| FCFE | \$78.79 | 5% |
| Total | \$24.38 | 100% |

Valuation Model 1 (Risky)

This model assumes 5% growth for two years and 0% growth per year thereafter. This model assumes that the new acquisition of Carbon Solutions will grow enough to patch potential losses from Tinuum Group.

| Model 2 (0% -> -5%) | | Weight |
|---------------------|----------------|-------------|
| DDM | \$11.15 | 47.5% |
| FCF | \$11.48 | 47.5% |
| FCFE | \$40.77 | 5% |
| Total | \$12.79 | 100% |

Valuation Model 2 (Conservative)

This model assumes 5% growth for two years and -5% growth per year thereafter. This model assumes that the loss of production tax credit capability from Tinuum is significant enough to damage the firm's cash flows long term.

| 50% Blend | | Weight |
|--------------|----------------|-------------|
| Model 1 | \$24.38 | 50% |
| Model 2 | \$12.79 | 50% |
| Total | \$18.59 | 100% |

Resulting Valuation

Weighting was deduced via the assumption that the Free Cash Flow to Equity model would overvalue the firm due to its recent significant leveraged acquisition of Carbon Solutions, LLC. The acquisition has not significantly impacted the EBIT that ADES reports, so the FCFE model has been weighted down as a result of this. However, the Free Cash Flow to Equity model cannot be entirely discounted due to the company's recent repurchase of shares due to leverage.

The final valuation is a 50% blend of the riskier Model 1 and 50% weight of the more conservative Model 2. The final valuation target price comes to **\$18.59**, a 25.28% increase in price over the current share price of \$13.89. Though historic returns are not necessarily indicative of future ones, the year-to-date return of 24% is notably close to this price target.

Investment Risks

- **Political Risk**

The future of ADES is subject to future environmental regulations of the United States Government as well as the upcoming Presidential Election in 2020. Should the Trump Administration be reinstated in 2020, we may see environmental regulations slashed but coal subsidies improved. Should a democratic candidate win the 2020 election, we may see increased environmental regulations but less or no handouts to the coal industry.

- **Economic Risk**

The Industrials sector historically performs best in the early to middle stages of the business cycle. Recessions tend to impact the Industrials sector negatively, but an important note is that ADES typically operates with companies that are involved in the energy sector. The Energy sector has historically performed well during peaks of the business cycle. Assuming we are moving into a peak, the revenue stream of ADES will do well.

As of this quarter, the United States economy has been growing with signs of volatility. The last major recession was in 2008, and some economists are predicting a recession. The Federal Reserve has cut interest rates twice, both times by 25 basis points. While these are warning signs, there is no reason to believe the economy cannot continue to grow and support the industrials sector as it has.

- **Social Risk**

Key factors influencing the preservation of coal as an energy source are the concepts of “clean coal” and “coal country”. Many individuals in the United States believe that coal is a core contributor to the success of America, and many small towns are built on top of coal mines. The loss of this idealism of coal may contribute significant harm to the future of coal, even as they adjust to more stringent regulations. Political pressures are placed on politicians to preserve coal jobs, specifically on Republican candidates, as seen in the 2016 election.

- **Technological Risk**

The protection of ADES’s patents and trademarks are key to the success of its business. Its newest patents expire in 2038, its oldest 2021. However, there are no signs that its business will be significantly impacted soon due to their patents covering the key aspects of its business model.

Developments in certain renewable energy may also pose problems for ADES. Their principle customers are coal companies, which are subject to potential removal from the energy market due to advancements in renewables like solar and wind energy.

- **Environmental Risk**

Most climate scientists agree that anthropogenic climate change is significant enough to require preventative action. Should this not become consensus among the leaders of the United States, ADES may face issues looking forward. In addition, reductions of the

power of the Environmental Protection Agency may limit their ability to regulate both potable water and gas emissions, damaging the potential of the firm.

- **Legal Risk**

The cessation of production tax credits may result in Tinnuum Group's inability to generate demand for its refined coal facilities. Though refined coal has been encouraged for production by the government in the past 8 years, it is not known whether any further tax credits will be permitted for future production of refined coal. These credits expire in 2021, so Tinnuum will need to find buyers for their remaining 5 refined coal facilities in two years.

Coal mining is also inherently dangerous, and legal action could be taken against the firm due to this. However, ADES's primary mining operation utilizes a technique called surface mining, which is far less dangerous and less susceptible to injury for employees.

Sources

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