FREE WEBINAR – 27th OCTOBER 2021

duration: 1 h 30 min
Start: 3 pm GMT (UK), 4 pm CET (Austria), 10 am US-Eastern time zone

Combustion optimisation and retrofitting

ENERGY FROM WASTE AND BIOMASS PLANTS

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Energy from Waste webinars
Connecting the global waste to energy industry

Webinar in association with...
technikgruppe®
COMBUSTION MANAGEMENT

Energy from Waste and TECHNIKGRUPPE invite you to a free technical webinar and round table discussion
COMBUSTION OPTIMISATION AND RETROFITTING OF ENERGY FROM WASTE AND BIOMASS PLANTS
(the webinar will be recorded for full on demand replay)

For Information about REGISTRATION please visit: **www.technikgruppe.com/technology-of-fire**

In this free webinar basic principles of unique methods for combustion optimization on forward moving reciprocating grates will be explained. Practical results will be analysed. Technical experts from Europe and USA will contribute in their presentations and round table discussion to a better understanding of improvement and modernisation in Waste to Energy and Biomass plants.

Participants are kindly invited to visit **www.technikgruppe.com/technology-of-fire**
If you need additional information please contact Mr. Damir Zibrat **damir.zibrat@technikgruppe.com**

Target audience:

- **plant managers**
- **operational managers**
- **maintenance managers**
- **performance improvement engineers**
- **plant engineers**
- **plant operator supervisors**
- **plant operators**

Key words:

- **technology of fire**
- **combustion optimisation**
- **retrofitting of WtE and BtE plants**
- **forward moving grate**
- **new grate technology**
- **reliability**
- **profitability**

Technology of fire

The combustion process in Energy from Waste and Biomass plants is very complex, and the demands on control systems in those plants are very sophisticated. There are many theories about the best combustion technologies to use and there are equally many different approaches to find the right solutions.

In most conventional control systems there are lots of implemented control algorithms and many arguments how to compare different approaches.

In all of these discussions there are two basic factors that are used in nearly all comparisons:

1. Which main actions have influence on the quality of the combustion process?
2. Which measured parameters can be accurately compared to estimate the combustion quality?

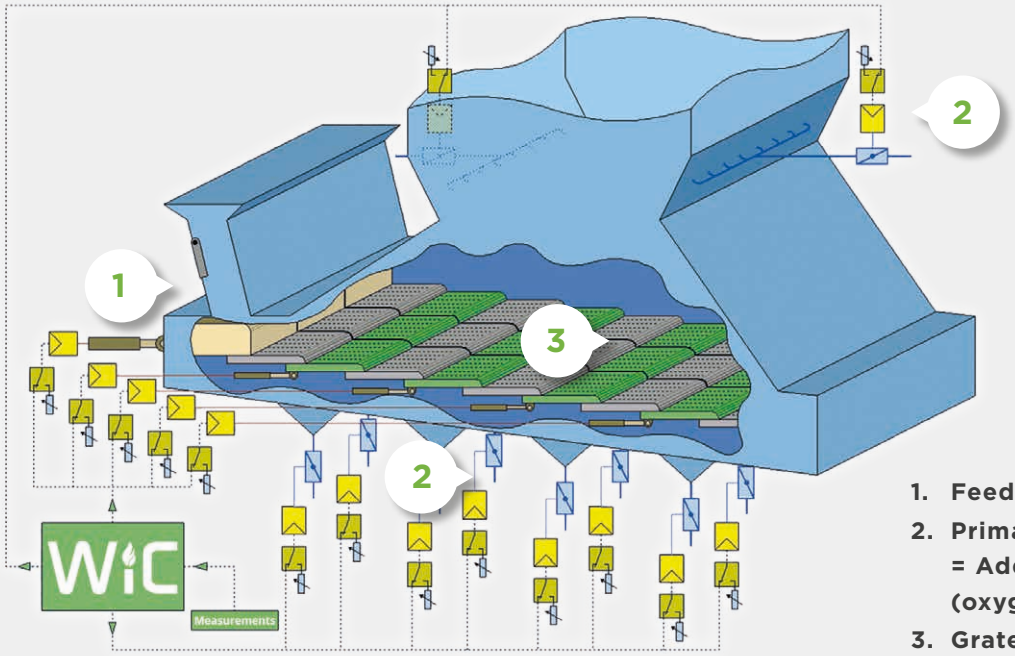
Simplistically there are 3 main actions which have influence on the combustion process.

1. Adding fuel into the burning chamber
2. Blowing oxygen into the fire
3. Mixing the fuel with combustion air

In 2022 TECHNIKGRUPPE will exhibit, present and network on two events in the UK.

WORKSHOP
OPERATIONAL OPTIMISATION
Birmingham 25–26 January 2022
A new event for Waste to Energy and Biomass plant managers and operations managers. (More information on this to follow shortly)

CONFERENCE
Energy from Waste
London 9-10 March 2022
Connecting the global waste to energy industry



1. **Feeder = Add fuel**
2. **Primary/Secondary air = Add combustion air (oxygen)**
3. **Grate = Mix the fuel with combustion air**

After more than 25 years of experience in combustion optimization, we can say that forward-moving reciprocating grates are ideally suited to the application of the 3 basic principles for combustion control.

These 3 main actions involve around 30 actuators. But these actuators offer many possible combinations for fine tuning.

If we have 20 actuators and each actuator has 10 possible positions - **how many possible combinations do we get??**

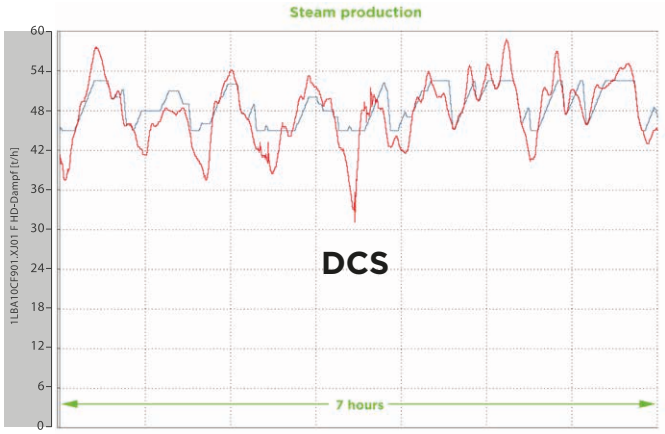
1 actuator provides 10 combinations // 0-1-2-3-4-5-6-7-8-9-
2 actuators provide 100 combinations // 00-01-02-03-04- 96-97-98-99
3 actuators provide 1000 combinations // 000-001-002-003-004-005-006-007 997-998-999
20 actuators provide 100 000 000 000 000 000 000 possible combinations for fine adjustment //
00 000 000 000 000 000 000 ..... 99 999 999 999 999 999 999

The status of the combustion process is changing every few seconds! **That means - every few seconds we need to fine adjust the actuators.** It is clear that the definition of appropriate combination every few seconds is a very complex task.

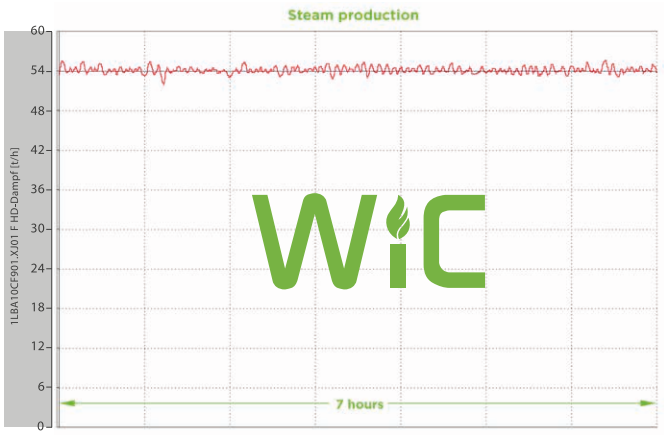
Whereas the checking of combustion quality itself is very simple → see some diagrams of KPI's from a combustion process.

Below are some graphs of real case improvements that have an impact on profitability, reliability and availability. The integration of the WiC leads to significant additional earnings through:

Stabilization and enhancement of steam production

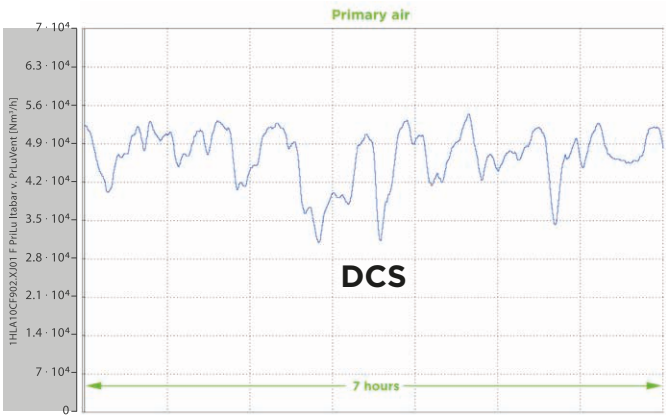


Steam production controlled by DCS

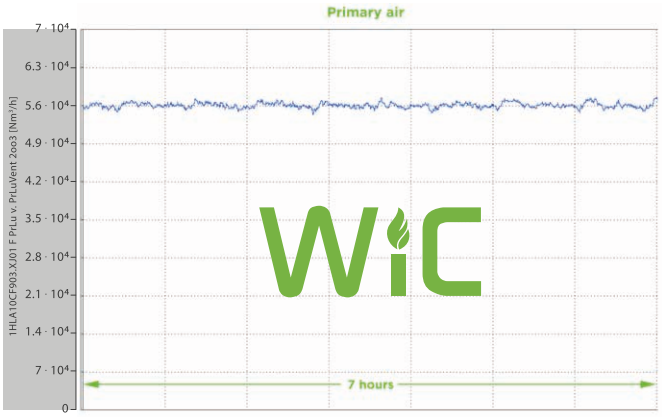


Steam production controlled by WiC (same line)

Stabilization of combustion air flow



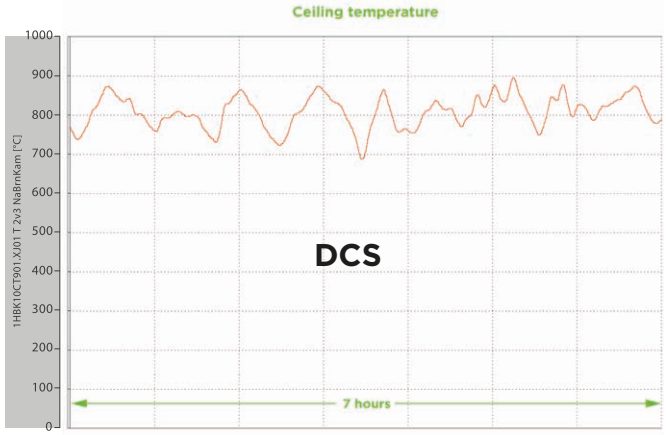
Primary air controlled by DCS



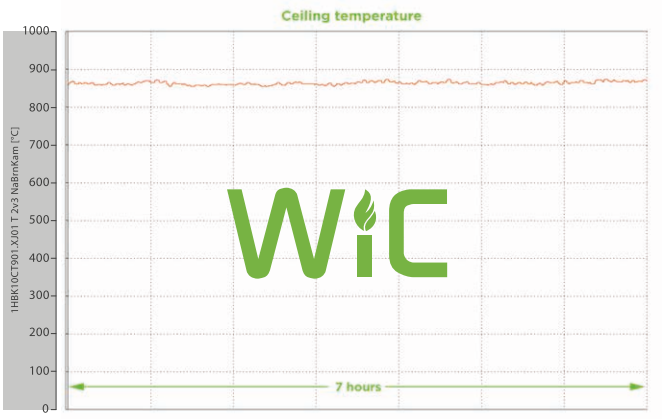
Primary air flow controlled by WiC (same line)

Please NOTE! The higher amount of primary air is related to an increase of waste throughput/steam production

Stabilization of flue gas temperature (ceiling temperature)



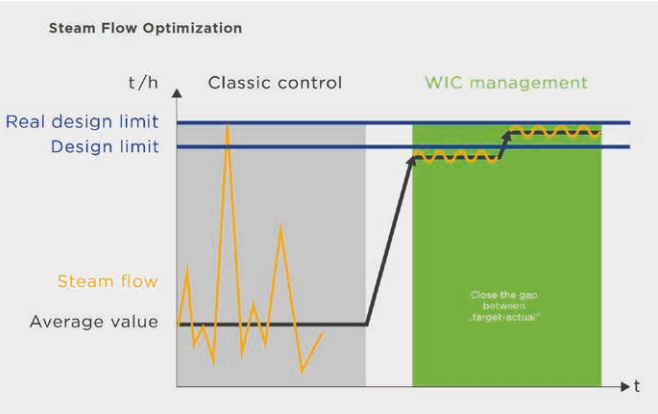
Ceiling temperature with DCS



Ceiling temperature with WiC (same line)

Please NOTE! The average temperature is, of course, higher because of enhancement of waste throughput/steam production

Enhancement of steam production towards real design limit



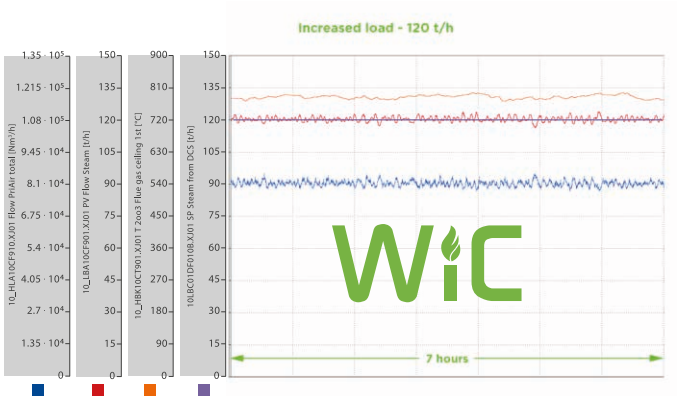
By implementation of classic control, big overshooting of steam production is possible and this is the main reason why the set point (average steam production) is kept below the design limit.

"Classic control" is very likely to produce dangerous overshooting above design limit! Therefore, in most cases, the design limit (MCR) is set **below the real design limit**.

That means, that in most cases the boilers are built with reserves to cover the overshooting due to lack of combustion control quality. These reserves may be utilised by implementing a more reliable and stable combustion control system. → WiC

Enhancing combustion capacity without mechanical changes

After stabilization of steam production, the real capacity could be determined.

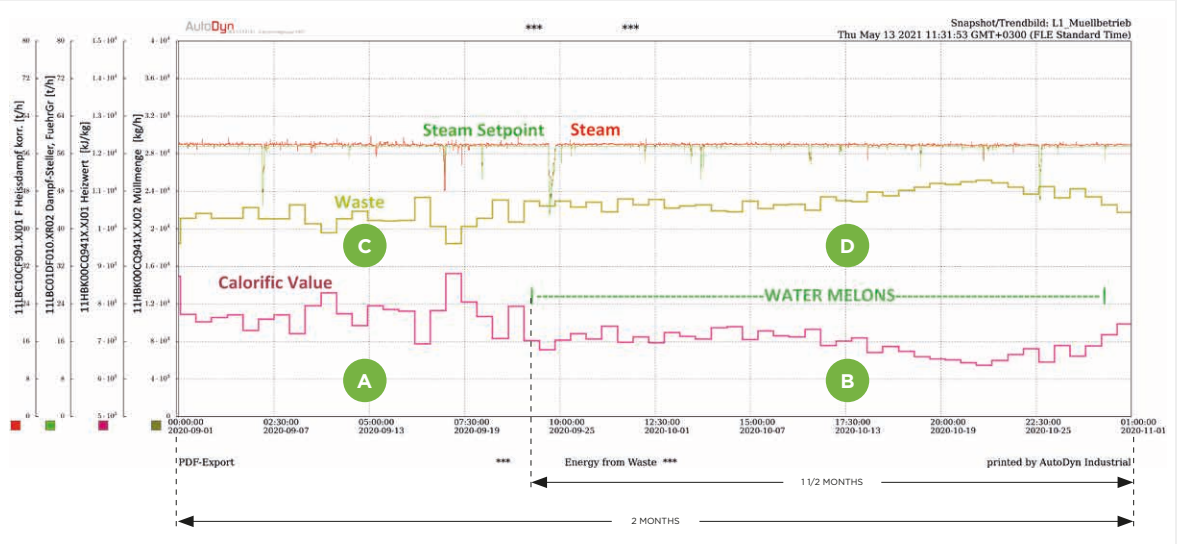


This finally led us to a load increase of 10 % from original MCR

It is important to note, that even after increasing steam production from 109 t/h to 120 t/h the steam production is still stable.

Combustion of low calorific waste

The incineration of waste with low calorific value is generally a very complex process. Due to the great experience and expertise in the field of combustion technology, very complex calculations and very powerful processors, the WIC-Combustion Manager can optimally carry out the incineration of low calorific waste. The following is an example of trends for an optimized incineration of low calorific waste.



- A — Calorific value normal waste average 7,5 MJ/kg
- B — Calorific value with watermelons average 6,5 MJ/kg
- C — waste throughput with normal waste average 21 t/h
- D — waste throughput with watermelons average 24 t/h

Technikgruppe

... is an Austrian engineering company with 40 employees having international experience and worldwide engagement. Due to its long experience in Energy-from-Waste and biomass Technikgruppe also acts as an independent consultant for technical and commerical issues.

Please contact us for any question. We are happy to exchange our experience.

Matthias Lukic C.E.O

Every combustion line is unique and is a complex technical system. Every combustion line should be individually adjusted to optimize its operation. Our tailor-made automation systems use extremely powerful control processors and extremely fast software to individually optimize each grate system to deliver a state-of-the-art combustion system that optimizes the combustion of waste to deliver:

- enhanced profitability
- enhanced reliability
- enhanced availability

Matthias Lukic, technical expert, founder, owner and CEO of Technikgruppe, has more than 25 years of experience in combustion of solid fuels on grates.

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Damir Zibrat, Business Development Manager of Technikgruppe, has more than 25 years of experience in international strategical selling and marketing.

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TECHNIKGRUPPE is permanently present on various Waste-to-Energy events in Europe and the USA. Our technical experts with professional support of sales and promotion experts are our strongest ambassadors in that field. Personal discussions on our presentations or our exhibition booth provide an excellent platform for exchange of experiences. Many photos from TECHNIKGRUPPE exhibition became „famous“ in our professional networks (see below).

TECHNIKGRUPPE at NAWTEC 2019 in Virginia.

TECHNIKGRUPPE at the Energy from Waste Conference 2020 in London.

For the photo gallery of the EfW Conference 2020, please use the link: **http://bit.ly/2Q1Eqig**.

SAVE THE DATE:

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OPERATIONAL OPTIMISATION
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See you at the booth of TECHNIKGRUPPE.

Applied Control Engineering

Applied Control Engineering (ACE) is proud to be selected as the US partner for Technikgruppe, a leader in deriving energy from waste and biomass sources. For more than 25 years ACE has been providing solutions in the energy industry and we are excited about the prospects and benefits that waste and biomass energy plants will bring to the sector.

Our experience and partnerships with various DCS and PLC manufacturers mean that ACE can seamlessly integrate these systems with your existing plants. Our expertise with reporting, metrics and data analytics means that your plant and operation managers and engineers will have the information that they need to run these systems efficiently.

APPLIED CONTROL ENGINEERING
THE RIGHT SOLUTION. ON-TIME. ON-BUDGET.

Shawn Coughlan is an owner at Applied Control Engineering, Inc. (ACE) where he has been employed for the last sixteen years. He earned his Professional Engineering License early in his career and has continued his professional development within the controls industry by learning new systems and earning several certifications. His 37-year career has seen him involved in control system projects in the power, chemical, refinery and pharmaceutical industries. He has worked all levels of projects from programmer to project manager.

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2021 System Integrator of the Year

On December 14, 2020 Applied Control Engineering, Inc. (ACE) was recognized as the 2021 CFE Media System Integrator of the Year in the mid-size system integrator category. This prestigious award recognizes ACE for its outstanding contributions to manufacturing growth and their innovative approach to solving customer challenges.

The 2021 System Integrator of the Year award recipients were selected by industry experts and CFE Media based on nominations from within the industry.

"The annual process of judging the System Integrator of the Year awards is both inspiring and difficult," said Jack Smith, CFE Media content manager. "There are many great integrators out there. Choosing from among them was challenging for this year's judges."

Thirty years ago, the original owners of ACE started our company with the idea that they could create an enjoyable place to work while helping customers enhance productivity through automation. This award not only solidifies that we are achieving this mission set out by our founders, but it also serves as a testament to the hard work and dedication of our employees. Throughout the years, our employees have been an integral part of creating the company we have today, and we know they will drive ACE's continued growth and successes into the future. We are incredibly proud that the industry is recognizing their contributions with this award as well.

Marco J. Castaldi, - Ph.D.; Professor; Chemical Engineering Department
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Director Earth System Science & Environmental Eng. (ESE)

Marco Castaldi was born in New York City and received his B.S. ChE (Magna cum Laude) from Manhattan College. His Ph.D. is in Chemical Engineering from UCLA and he has minors in Advanced Theoretical Physics and Astrophysics. Prior to joining CCNY he was Associate Professor at Columbia University's Earth & Environmental Engineering Department. Professor Castaldi has approximately 90 peer-reviewed research articles, 40 peer-reviewed conference papers, 2 textbooks, 3 book chapters and 11 patents in the fields of catalysis, combustion and gasification. Some of his research findings have been covered by The New York Times, The Observer, CNN, and other trade publications. In addition, he was the Editor of the North American Waste to Energy Conference (NAWTEC) Series (ISBN: 978-0-7918-4393-2), Co-Editor of the Waste to Energy text published by Woodhead Publishing, Editorial Board Member of Waste and Biomass Valorization published through Springer (ISSN: 1877-2641) and Catalysts (ISSN 2073-4344). Prior to his academic career in Professor Castaldi worked first as Manager of Fuel Processor Component Development for Precision Combustion Inc. in New Haven, CT overseeing projects totaling $5 MM. Professor Castaldi is Past Chair of the Materials and Energy Recovery Division of ASME, Past Chair of the Research and New Technology Council of AIChE and recent Past-Chair of the North American Catalysis Society's New York Metropolitan Section. He is a consultant to several companies including WasteManagement and AECOM. Recent professional activities and awards include:

2019	Fellow, American Society of Mechanical Engineers (ASME)
2018	Fellow, American Institute of Chemical Engineers (AIChE)
2016	Fulbright Fellow, Global Award
2015	National Academies' Intelligence Science and Technology Expert Group (ISTEG)
2014	National Research Council, Panel Member Appointment
2012 – 2015	Chair, Research and New Technology Council (RANTC) for the American Institute of Chemical Engineers (AIChE)
2007 – 2012	Sustainability Steward of the Research and New Technology Council (RANTC)
2010 – 2011	Chairman, North American Catalysis Society's New York Metropolitan Section
2011 – present	Executive Committee: American Mechanical Engineering Soc. (ASME) Material & Energy Recovery Division
2012	National Academy of Engineering Fellow, Frontiers of Engineering Education

2010	American Chemical Soc. Environmental Division Best Paper Presentation
2010	Columbia University Presidential List of 100 Prestigious Faculty
2009	National Science Foundation CAREER Award
2009	International Precious Metal Institute Student Advisor Award
2007	Chinese “111” Program of Overseas Academic Backbone University Introduction
2006	Columbia University, SEAS Distinguished Faculty Teaching Award
2005	ASME, Gas Turbine Award
2004	ASME, Best Applications Paper Award
2002	Manhattan College, Top 10 Engineering Professors

Dr. Castaldi is the Director of the Waste-to-Energy Research and Technology Council (WTERT) in the United States, an international organization that supports several students and post doctoral researchers; also, his group is recognized by the American Society of Mechanical Engineers as the foremost research group on chemical kinetics of converting wastes to energy. Dr. Castaldi’s research will lead to the development of advanced waste-to-energy processes and in particular the high-efficiency recovery of energy from biomass processes using catalysis. Understanding the fundamental reaction sequences and their associated kinetic parameters is the sure way to provide the requisite capability to explore and develop new technologies while improving existing ones for converting “waste” resources into renewable energy. Currently Dr. Castaldi has established the Earth Engineering Center at City College, City University of New York. The goal of EEC|CCNY is to bring to bear rigorous engineering solutions that enable responsible use of energy and materials for the advancement of society. Through industry collaborations and research sponsorship EEC|CCNY develops novel solutions to some of the world’s most pressing problems. EEC|CCNY routinely engages students with industry professionals enabling a holistic approach to creative realistic, forward-looking applications. The reach of EEC|CCNY is international in scope with many projects connecting international students and companies with a global presence

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