



BREATHE

PREFACE

ZACKERY DENFELD, COCLIMATE
JODI NEWCOMBE, CARBON ARTS

Globally, there is a growing recognition that addressing air pollution, climate change, and related health and environment issues, is not simply a scientific or technical problem, but a cultural one. To a large extent, we already possess the technology and best practice policy examples needed to ensure the well-being of people and make our future sustainable, but these aren't always enough to drive change. At heart, responding effectively to climate change means confronting our personal identity, worldviews, and sense of loss experienced from any sort of change.

Artistic expression is a call to do just that, and as the organizers of this exhibit, we are delighted to be invited to display works of art from many parts of the world that provoke us to step back and be mindful of our health, our environment and the legacy that we are creating for ourselves and the next generation.

In identifying artists and designers for the BREATHE exhibition in Geneva, developed for the opening evening of the High Level Assembly of the Climate and Clean Air Coalition (CCAC) to Reduce Short-Lived Climate Pollutants, (Geneva, Switzerland May 19-20th, 2015), we sought out people working at the intersection of creativity, technology, science, health, and society. Many of the practices on display in this exhibition are interdisciplinary in nature; the artists have collaborated with scientists, engineers, or journalists. In many cases, the work you see installed in the BREATHE exhibition is a small snapshot of ongoing research and creative practice that extends onto the internet, into the streets, and which can not be fully captured in a single exhibit display.

We invite you to use this catalogue as a starting point—to think in new and different ways about the concerns and issues displayed, and if relevant, learn more about the work, the artists and their practices. The exhibit is only a small sample of what is available. We display work by artists and designers from a diversity of cultures and backgrounds. However, wherever you are from, should you look deeper, you will find creative practitioners who are integrating science, health, and society in your city, country or region – people who may be eager to engage with you to use art as a tool for positive change. In that spirit, we welcome you to the BREATHE exhibition. We hope this exhibition will act as a catalyst for further synergy between the arts, health, and environmental well-being.



PUFF

KAROLINA SOBECKA

SOFTWARE DEVELOPMENT: JAMES GEORGE

Puff is a cloud-shape car accessory that attaches near the exhaust pipe of automobiles. It's color changes dynamically and visualizes the amount of pollution the car is producing. Green indicates the lowest rate of pollution, red the highest. The app logs driving data like total amount of CO₂ emitted, the average rate of emission, the total number of miles driven, and the average MPG. It also estimates how much NO_x, CO, and hydrocarbons have been released. Puff captures feedback about how much pollution is produced during driving, helping drivers learn and improve driving practices that will minimize their impact. Puff is one part of a project called Amateur Human that explores design's potential to be subverted for other ends at the heart of consumer culture. The project investigates the role of personal devices in visualizing environmental impacts, the process of bringing such devices to market, the distribution and diffusion of new devices to users, and other critical issues of consumption-related practices.



VOYAGE ON THE PLANET

CHIU CHIH

Designer Chiu Chih's custom-designed backpack and narrative images explore how deteriorating air quality, crowded environments, and the changing face of the built landscape impact experiences of migration, resilience, and preparedness. Prompted by his early life experiences with dislocation, relocation, and growing up in fast-changing urban environments, the backpack is described as a "Survival Kit for the Ever-Changing Planet", which serves as a source of sustenance for the planet's unknown future. "Like warriors bring their family's photo with them in the war, like spacemen carry air from the Earth to go explore other planets," says the designer who was born in the Taipei area, spent part of his childhood in mainland China and now lives in the UK. "It's about young guys who leave their hometowns and go explore their future elsewhere."

MODEL IN IMAGE
Wang Weilin



CARBON PENCILS

GYORGYI GALIK, NATALIE JEREMIENKO
AND FRANK KELLY

Typically descriptions of air pollution and its health impacts are mediated by way of statistics, maps, and measurement data that is often abstract and difficult for the general public to understand. In Carbon Pencils, data is approached as performative and playful—so as to make an often abstract issue more personal and tangible.

The designers estimated the amount of PM_{10} that would be captured by an air pollution monitor in a heavily trafficked London site, or inhaled by the typical adult or child around the site, in the course of a 1–3 year period. Those exposures are then compared to the amount of carbon that a pencil typically contains. The visualization was built upon an average 17,5 cm-long pencil with a carbon core that weighs around (~) 976 milligrams (mg). The average PM_{10} concentration at the site was recorded as ~25 microgram/cubic meter of air. Different lengths of pencils are then used to reflect the amount of pollution exposures. The process of making the calculations is also explained, along with the health impacts of the exposures.

The work is a collaboration of the London-based designer and researcher Gyorgyi Galik, with the artist and engineer Natalie Jeremijenko, director of the Environmental Health Clinic at New York University and Frank Kelly, director of the Environmental Research Group at King's College, London.

ART, INSPIRATION & RISK

GABRIEL HARP, CoCLIMATE

This exhibition, entitled BREATHE, provides a chance to reflect, and be mindful about the linkages between health, the environment, and public engagement. The exhibition offers attendees a small sample of evidence, objects, visualizations, images, and gestures; each is designed to convey the impacts of air pollutants and what those impacts mean for personal and environmental health. The work presented here is a provocation for attendees to explore the future linkages of air quality, technology, culture, infrastructure, and health within their own jurisdictions.

This exhibition is also an opportunity to explore and reflect on the goals and motivations of those who are most well positioned to improve air quality—as well as the goals and motivations of those people who are most vulnerable to its hazards. We know that people have distinct and diverse motivations and capacities for change. Recognizing those differences—and accounting for them—can become a powerful source of inspiration, and creative engagement for change-makers and vulnerable populations alike.

But why use art? Why not show the facts to spur action or exhibit more conventional persuasive messaging examples? The answer to that question lies deep at the heart of human psychology, and it stems from the diversity of human experience. People interpret information about the environment—and their experiences with the environment—in vastly different terms. As a result, risks and linkages between human and environmental health hazards are treated very differently by different people. When it comes to the environment (and even personal health), there is no such thing as common sense. Instead, the vast majority of people on the planet look to those who are closest to them for evidence of what works and for moral guidance.

The impact of art—like air pollution—exists at the level of human experience, rather than at the level of direct communication. It is an inherently “fuzzy”, ambient, imprecise, and inefficient form of communication. Those same qualities also make it special and powerful; it speaks more directly to different kinds of people through the common bonds of human experience—the senses.

Artists and designers ask what emotions are possible, and they invoke those emotions using an array of skills, materials, and meaning. Emotions connect directly with people’s deep-seated moral foundations through novel aesthetic experiences, visceral reactions of disgust, pleasure and surprise, abstract confusion and uncertainty, or even a sense of alienation about one’s own identity and role in society. Art prompts audiences to reflect on their personal experiences, to update their mental models for how the world works, and to expand their worldviews to encompass new goals for themselves and new forms of risk and reward. Art provokes informed citizenship.

Air pollution is now one of the world’s largest health risks, and the biggest environmental health risk – with some 7 million deaths annually attributable to outdoor and household air pollution from heart disease, stroke, respiratory diseases, and cancers. Now imagine the roughly 7 million inhabitants in the cities like Hong Kong and Rio de Janeiro or in countries like Jordan and Switzerland. Now re-imagine the impact of air pollution. It’s huge.

Art often employs metaphors, and the best examples connect directly with people’s everyday experiences and senses. What does smog taste like? Is it sweet, salty, bitter, or sour? How does it make you feel? We often write about social and environmental change using terms like “force”, “impact”, or “movement” to describe its weight in terms the body can understand. But how do most people actually experience those changes? Is it hot or cold? Does climate change mitigation require the tiniest push of a pen or the Herculean effort of moving a boulder? Without readymade comparisons, it can be difficult for ordinary people to imagine the task at hand. Art and artists draw these comparisons and make them visible; they lower the cognitive effort of uncertainty.

This exhibition presents original works of art to stimulate new perspectives. By creating awareness and asking audiences to reflect, the work provides a platform for different audiences to learn and absorb the common molecules of human experience, to identify risks on their own terms, and to assess the vulnerabilities that are most meaningful for them. Art takes people out of the ordinary, the expected, and the anticipated. It opens people’s minds to new possibilities, alternative scenarios, and unexpected paths of action. We hope you will **do** the same.

AIR POLLUTION, CLIMATE AND HEALTH: THE LINKS

HELENA MOLIN VALDÉS

HEAD OF THE SECRETARIAT OF THE CLIMATE AND CLEAN AIR
COALITION TO REDUCE SHORT-LIVED CLIMATE POLLUTANTS (CCAC)

Breathe Life: protecting health and climate by improving air quality, is a new global campaign to reduce emissions of “short-lived climate pollutants” that are a significant component of air pollution harming both health and climate.

Air pollution is now the world’s largest single environmental health risk, responsible for an estimated 7 million premature, preventable deaths every year, according to the latest data from the World Health Organization. Only 12% of cities achieve WHO guideline levels for air quality—and many cities suffer from air pollution levels that are double, triple or even more above WHO guideline limits.

Significantly, many of the most health-harmful air pollutants also exacerbate climate change. These include black carbon, a component of fine particulate matter emitted by diesel engines, biomass combustion and other sources. Ozone is another air pollutant as well as a climate pollutant. Ozone is formed through the interaction of diverse urban and peri-urban pollution emissions, including traffic, power plant and building exhaust, as well as emissions of methane (in itself another powerful short-lived climate pollutant) from waste, sewage and agriculture.

Ozone, black carbon and methane are all called ‘short-lived climate pollutants’ (SLCPs) because they ‘live’ in the atmosphere for a relatively short time – about a week to 10 days (for black carbon) and a decade (for methane). The good news, however, is that if short-lived climate emissions can be reduced, then their concentrations in the atmosphere drop rapidly. This means a noticeable improvement on people’s health as well as reduced near-term global warming. While the world urgently needs to reduce CO₂ emissions as a long-term solution to climate change, carbon dioxide persists in the atmosphere for a century or more. So reducing SLCPs can help slow the pace of warming, buying time until CO₂ emissions reductions begin to have an impact.

In one recent assessment, the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) estimated that the pace of climate change could be reduced by as much 0.5°C (2010–2050) if a range of affordable measures to reduce SLCP emissions were immediately put into place, including diesel engine and fuel improvements, clean cooking and home heating solutions, improved municipal waste management, and others.

Such measures would also have significant health benefits. Take black carbon emissions, for instance. Black carbon is a key component of fine particulate matter (PM_{2.5}). When inhaled, PM_{2.5} penetrates deep into our lungs, increasing the risk of disease and premature death. Black carbon enters the air as ‘soot’ particles from the incomplete combustion of biomass and fossil fuels in cookstoves and heaters, diesel engines and vehicle operation, open pit waste burning, and brick production. Black carbon particles also contribute to longer-term climate change impacts by absorbing sunlight and warming the atmosphere. Black carbon emissions thus accelerate the melting of glaciers and amplify changes in monsoon cycles—with implications for water availability and agricultural production.

Methane is a very powerful greenhouse gas, especially in the short term, with a warming potential up to 20 times that of carbon dioxide. About 60% of methane emissions are from human sources—primarily agriculture (livestock manure), fossil fuel production and distribution, and municipal solid waste. While methane itself does not directly affect health, it reacts in the atmosphere with other urban and peri-urban or rural pollution emissions to create tropospheric ozone—harmful to respiratory health. And ozone inhibits plant development, leading to declines in agricultural productivity.

The Climate and Clean Air Coalition, World Health Organization and government of Norway are leading the *Breathe Life* campaign, which aims to increase awareness and understanding amongst members of the general public and media, and as well as amongst stakeholders in the health sector, in national and urban governments and other sectors, to understand and address the main sources of air pollution, such as cooking and heating stoves, diesel engines, municipal solid waste, and brick production.

For more information about the Climate and Clean Air Coalition, visit ccacoalition.org or [@CCACoalition](https://twitter.com/CCACoalition) or facebook.com/ccacoalition.

DEVELOPMENT'S HEALTHY HEARTBEAT

DR MARIA NEIRA

DIRECTOR FOR PUBLIC HEALTH, SOCIAL & ENVIRONMENTAL
DETERMINANTS OF HEALTH, WORLD HEALTH ORGANIZATION

New World Health Organization (WHO) estimates released last year reported that in 2012 around 7 million people died—one in eight of total global deaths—as a result of exposure to air pollution. This finding more than doubles previous estimates and confirms that air pollution is now the world's largest single environmental health risk. Reducing it could save millions of lives.

The new data particularly reinforce evidence about the links between air pollution exposure and cardiovascular diseases, such as stroke and ischaemic heart disease. This is in addition to air pollution's role in developing respiratory diseases, including acute respiratory infections and chronic obstructive pulmonary diseases, as well as cancers.

The estimates are based both on more knowledge about the diseases caused by air pollution, and on better assessment of human exposure to it, enabling scientists to make a more detailed analysis of health risks from a wider demographic spread that now includes rural as well as urban areas.

As our world faces an unprecedented epidemic of noncommunicable diseases (NCDs), health and environment policymakers need to understand how health risks are exacerbated by air pollution, as well as more broadly by unhealthy home and urban environments.

Some 3.7 million deaths globally are attributed to outdoor air pollution. Among the key sources are traffic emissions, power generation, outdoor waste, biomass burning, and the use of energy in buildings. Another 4.3 million deaths are linked to household air pollution, mostly from exposures to smoke emissions from rudimentary biomass and coal cookstoves and fires, upon which nearly three billion people worldwide primarily depend. Many people are exposed to both indoor and outdoor air pollution. Due to this overlap, mortality attributed to the two sources cannot simply be added together, hence the total estimate of around 7 million deaths in 2012.

Most air pollution-related morbidity and mortality assessments are made on the basis of airborne concentrations of PM_{2.5}—particulate matter less than 2.5 micrometers (µm) in diameter. Meanwhile, ground level ozone, formed from a mix of urban air pollution emissions, is a factor in chronic asthma and respiratory disease.

Many of the air pollutants that are most harmful to health also damage the climate. These include the so-called “short-lived climate pollutants”—such as ozone and black carbon, the sooty component of small particulate matter that is emitted by both by diesel engines and cookstoves—which get their name from their short lifespan in the atmosphere. Cleaning up these, in particular, can generate immediate health and near-term climate benefits.

While framing the problems is an important first step—doing something about them is the greater long-term challenge. Public policies can help shape a healthy environment in which to live, work, and raise families through all stages of the life cycle. WHO works to promote such policies for primary prevention in housing, energy, and transport and food production, upstream through a range of activities.

We join with our fellow UN agencies, national governments and ministries and civil society, in campaigns and coalitions, including the UNEP-hosted Climate and Clean Air Coalition to Reduce Short-lived Climate Pollutants, where WHO is a leader of a new health initiative.

Together, these activities touch every one across the planet – rich and poor, newborns and elderly. They help support health and well-being in our journey through life by avoiding and eliminating unnecessary illness, injury and death. This is the healthy heartbeat of sustainable development.

For more about WHO's health, environment and climate activities, visit our pages at www.who.int/phe

(Excerpted from a WHO contribution to the publication “Our Planet” special issue on health and environment, United Nations Environment Programme, 2015)



SMOG TASTING

THE CENTER FOR GENOMIC GASTRONOMY
WITH NICOLA TWILLEY

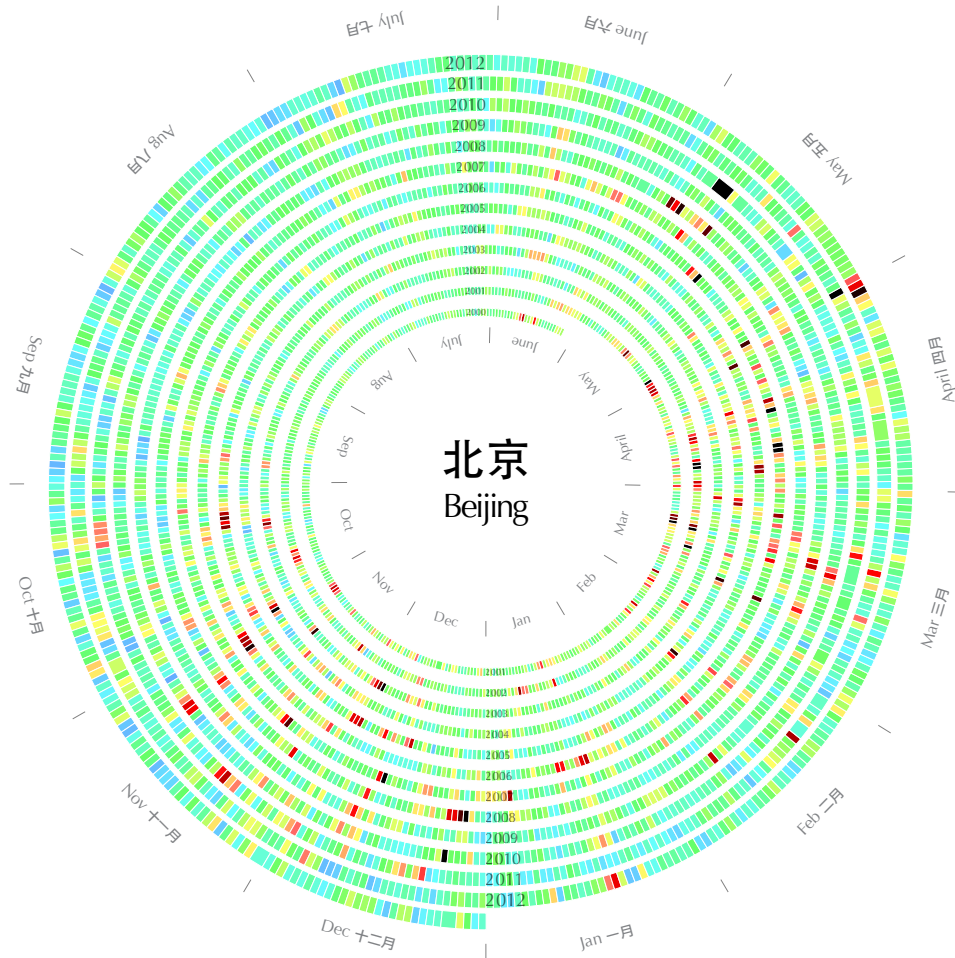
Smog Tasting uses egg foams to harvest air pollution. Because egg foams are up to 90% air, the resulting meringue confections are edible snapshots of air quality and different locations can be tasted and compared.

In the latest version of this research, air is harvested by whipping meringues inside of a “smog chamber”—a device that simulates air quality conditions from different locations. Developed in consultation with Professor David Cocker, of the Center for Environmental Research and Technology, University of California Riverside, the smog chamber used here is similar to a simple research laboratory model. It simulates the types of pollutants emitted in urban and agricultural environments, releasing precursor chemicals—such as amines, ammonia, dust, hydrocarbons, NO_x , soot and sulfur terpenes—which are stimulated by UV-lights. No lead, mercury or other highly dangerous heavy metals are used, just in case someone does decide to “taste”.

Confronted with the choice of eating a smog meringue, the participant experiences a tangible sensory encounter with a largely invisible aspect of our environment; banal air quality data and passive inhalation is transformed into a culinary—and emotionally charged—experience. In fact, due to the efficiency of the digestive system, eating a smog-filled meringue is likely to be less of a health risk than inhaling smog, where pollution may enter the bloodstream more directly via the lungs. Are you an adventurous eater, or will you take the smog-filled meringue home as a keepsake? Either way, most of us breathe polluted air **everyday.**

SKY COLOR OF 10 CHINESE CITIES 2000-2011

XIAOJI CHEN



Resembling the growth rings of trees, these graphics help solve a key knowledge challenge of information overload by showing the meaningful air quality patterns that emerge from visual comparisons of cities, seasonal variation, and time. Sky Color of 10 Chinese Cities displays a decade of air pollution index values for 10 different Chinese cities. The graphics were produced with the open-source statistical software package, R, using official data from the Ministry of Environmental Protection, China. Can you identify here the impacts of air pollution interventions, such as the significant improvement in Taiyuan's air quality over time, or how Beijing's air quality changed between August and September, 2008 when the city hosted the Olympic Games? Although most people do not have the technical knowledge to interpret graphs and charts, unique and creative information visualizations can be an important decision support tool, making data-based insights and patterns more accessible for broader audiences.

Sky Color of 10 Chinese Cities was produced by Xiaoji Chen, a user experience designer at Microsoft. Previously she worked at MIT's Senseable City Lab, receiving a Master of Science degree in Design and Computation. Her research interest is computational design, information graphics, interaction design and new media technology's impact on cities.



TENDING TO THE FIRE

Cooking is a universal practice. For primitive humans, knowledge of cooking was the great leap forward to better nutrition. Until recently, the fact that stove emissions could be dangerous to health was poorly understood. Today we know. Smoke from rudimentary biomass and coal cookstoves still used by about 3 billion people worldwide, claim about 4.3 million lives prematurely every year, according to the World Health Organization. Women and children gather fuel at the expense of more productive activities. The gradual loss of vegetation in already fragile regions threatens watersheds and ecosystems. Charcoal production as well as use of inefficient coal and biomass cookstoves also generate significant emissions of black carbon, a short-lived climate pollutant.

In cultural and artistic exploration, however, the domestic fire or cookstove remained universal symbols of nourishment and security until very recently. From the classical world to contemporary times, artists portrayed images of individuals or families huddled around the comforting light of a fire against the darkness of night. Human vulnerabilities associated with cookstove pollution were rarely a topic of exploration. Now, however, artists, as well as scientists and activists have begun exploring photography as a means to illustrate cookstove pollution – and its impacts on humans and society. Designers, technologists and business people are making headway in addressing the challenges associated with improving traditional stove designs, and making clean alternative fuels, such as biogas and ethanol more accessible and affordable. It is all part of the quest to reinvent humankind's most ancient innovation in a form that is better for health and the environment.

THANK YOU'S

We would like to thank all of our partners and collaborators in this event. Special thanks go to: The CCAC and WHO support teams for sharing a vision of this exhibition with us in the first place, and for allowing us the freedom to explore the subject matter as curators. These teams included Sandra Cavalieri, Kristina Smukste, Tatiana Kondruchina, and James Morris of the CCAC Secretariat, as well as Elaine Fletcher, Marina Maiero, Dr. Carlos Dora, Dr Diarmid Campbell-Iendrum, Nada Osseiran, Pablo Perenzin, Saydy Karbaj, Sabina Moya Huerta, and Judy Sanchez Santana of WHO. Imogen Martineau and Ariel Charney (WHO Consultants **also** provided vital support.)

Another round of thanks to our WMO hosts, who provided us with the space for this exhibition at their Geneva Headquarters, as well as critical logistics advice **and** guidance and support. These included: Joy Shumake-Guillemot, João Eduardo Morais Raposo, Clare Nullis, Monique Schalk, and Céline Frezat of Newrest Canonica, host of our reception.

We also would like to thank Waka Waka cookstoves, African Clean Energy, and C-Quest **capital** for loaning sample cookstoves during our curatorial research.

Most of all, we thank the artists for their courage, vision, and skill.

ABOUT THE CURATORS

CoCLIMATE

CoClimate's mission is to provoke, stimulate, and inspire new connections between people, technology, and the environment. Working at the intersection of the creative arts and organizational change, CoClimate's researchers and designers create imagery, experiences, and objects that are beautiful, compelling, imaginative, and legible for people from different worldviews and frames of reference. Our goal is to re-engage exhausted audiences, providing them with the cultural tools and resources they need to clarify the meaning, role, and impacts of climate change on their lives.

www.coclimat.com

CARBON ARTS

Carbon Arts' mission is to generate and evaluate creative models for engaging society in imagining and shaping a more sustainable future. Central to this vision is that both creativity and collaboration across disciplines, particularly the inclusion of the artist, is essential to addressing – or redressing – environmental crises. Over the past four years Carbon Arts has forged new avenues for artists and designers to collaborate with non-arts partners in science, engineering, urban planning and government to address sustainability, through public art commissions, performances, events and workshops.

www.carbonarts.org

CREDITS

CURATION

Carbon Arts and CoClimate

EXHIBITION & CATALOGUE DESIGN

Emma Conley & Cathrine Kramer (CoClimate)

IMAGE CREDITS

COVER

Lungs, FCIT, <http://etc.usf.edu/clipart/>

Smog from Primrose Hill BT Tower, Luton Anderson, (CC BY-SA 2.0)

<https://www.flickr.com/photos/lutonanderson/5641181503/>

BOOKLET

All images courtesy of the artists.

Tending to the Fire image, Nigel Bruce, University of Liverpool.

FIND OUT MORE ABOUT THE WORKS IN BREATHE

PUFF

<http://www.amateurhuman.org/designs/puff>

<http://www.gravitytrap.com/artwork/puff>

<http://www.gravitytrap.com/info>

VOYAGE ON THE PLANET

<http://www.fastcoexist.com/3024611/this-wearable-plant-cleans-the-air-for-you-when-pollution-is-bad>

<http://www.designboom.com/art/chiu-chihs-survival-kit-for-the-ever-changing-planet/>

CARBON PENCILS

<http://gyorgygalik.com/Experiments-with-Invisible-Pollutants-I-Carbon-Pencils>

SMOG TASTING

<http://genomicgastronomy.com/smog-tasting>

SKY COLOR OF 10 CHINESE CITIES

<http://xiaoji-chen.com/blog/2011/sky-color-of-10-chinese-cities/>

COOKSTOVES

<http://cleancookstoves.org/technology-and-fuels/testing/protocols.html>

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**CLIMATE &
CLEAN AIR
COALITION**
TO REDUCE SHORT-LIVED
CLIMATE POLLUTANTS

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