Negative: Traffic Lights

By “Coach Vance” Trefethen

***Resolved: The United States federal government substantially reform the use of Artificial Intelligence technology***

Case Summary: The AFF plan has the federal government fiat that all traffic lights in America have to use Artificial Intelligence to improve traffic flow.

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Negative: Traffic Lights

INHERENCY

1. Electric cars will solve for emissions

Before long, most cars will be electric vehicles, bringing dramatic reductions in gasoline consumption

Stephen Lacey 2017 (journalist) 17 July 2017 “Everyone Is Revising Their Electric Vehicle Forecasts Upward—Except Automakers” <https://www.greentechmedia.com/articles/read/everyone-is-revising-electric-vehicle-forecasts-upward> (accessed 23 Nov 2021)

The International Energy Agency has more than doubled its estimate about global electric-vehicle sales. Meanwhile, Exxon, BP and Statoil are all now expecting at least 100 million electric vehicles to hit the roads worldwide between 2030 and 2035.  BNEF's outlook is even more bullish. It projects that 530 million cumulative electric cars will be sold by 2040 -- representing about one-third of the market for automobiles.  In the spring, Morgan Stanley [issued an analysis](https://electrek.co/2017/05/05/electric-vehicle-sales-vs-gas-2040/) predicting that electric cars would outpace gasoline-powered cars within two decades. The new outlook from oil majors is consistent with a recent analysis from Wood Mackenzie, the firm that owns GTM. According to Wood Mackenzie, electric-car sales [will hit 100 million by 2035](https://www.woodmac.com/analysis/2035-electric-vehicles), stripping up to 2 million barrels of oil demand per day. In another analysis, Wood Mackenzie [predicted](https://www.greentechmedia.com/articles/read/Wood-Mackenzie-EVs-Will-Reduce-US-Gasoline-Demand-by-300000-Barrels-Per-D) that Tesla's Model 3 sales alone will slash U.S. gasoline demand by 300,000 barrels per day by that time.

SOLVENCY

1. No federal jurisdiction

Traffic lights are owned by state and local governments

Dr. Christopher A. Simon, Dr. Brent S. Steel & Dr. Nicholas P. Lovrich 2018 (Simon – PhD in political science. Steel – PhD in political science. Lovrich – PhD in political science.) State and Local Government and Politics: Prospects for Sustainability <https://open.oregonstate.education/government/open/download?type=pdf> (accessed 23 Nov 2021)

State and local government are the most visible levels of government in the United States. As you leave your family house, apartment, or school dormitory you encounter state and local government services, programs and infrastructure. From traffic lights, streets and highways, water and sewer services, K-12 education, higher education, parks, mass transit, law enforcement, utilities, communications and mass media, and many other activities, state and local governments are either directly involved in offering these services or in regulating organizations hired to provide such services.

Federal government cannot command state officials to carry out federal directives

Scott Bomboy 2021 (*editor in chilef of the National Constitution Center*) 13 Aug 2021 “The constitutional issues related to Covid-19 mask mandates” <https://constitutioncenter.org/blog/the-constitutional-issues-related-to-covid-19-mask-mandates> (accessed 23 Nov 2021)

In August 2020, the [Congressional Research Service also wrote](https://crsreports.congress.gov/product/pdf/LSB/LSB10530) that federal constitutional precedents made it unlikely that the federal government could issue a national mask wearing mandate that applies to the states. The 10th Amendment’s anti-commandeering provision bars “the federal government from commandeering or requiring state officers to carry out federal directives.

2. Requires more than just AI to implement

Affirmative source about “75% reduction” says you also need “connected vehicles” and “congestion charges” to solve

Ann Moreno 2020 (journalist for CNN) 29 Dec 2020 “AI and smart traffic lights could transform your commute” <https://www.cnn.com/2020/12/18/world/ai-smart-traffic-lights-transform-commute-spc-intl/index.html> (accessed 23 Nov 2021)

Ganser says combining smart lights, connected vehicles, and congestion charges "leads to a traffic system that, under good conditions, allows almost jam-free roads." He estimates that combination could reduce congestion by around 75%, saving large cities billions of dollars every year.

Failure: 2/3 of the required elements are extra-topical and cannot be implemented by the AFF plan

“Connected vehicles” that talk to each other and signal each other either don’t exist yet (there is no Affirmative evidence that they exist) or cannot be implemented by Affirmative fiat since there’s no evidence they are AI. And “congestion charges” are toll roads that charge higher fees when traffic is higher, and lower fees when it is lower. They give incentives for people to change their driving habits – a great idea, but it’s not AI and cannot be implemented by the Affirmative plan because it’s extra-topical.

Impact: No solvency

None of the benefits they promised are supported by their evidence because their evidence is talking about a combination of policies their plan doesn’t do. All their solvency evidence can be dropped from the round and the result is that there’s no evidence this plan will work.

AI alone isn’t enough – you also have to change people’s driving behavior

Ann Moreno 2020 (journalist for CNN) 29 Dec 2020 “AI and smart traffic lights could transform your commute” <https://www.cnn.com/2020/12/18/world/ai-smart-traffic-lights-transform-commute-spc-intl/index.html> (accessed 23 Nov 2021)

Damon Wischik researches traffic flow optimization using AI at Cambridge University. He's developing software to control traffic signals in UK cities. He equates "queues of cars at traffic lights as blocks in Tetris," which can be re-routed using AI. "If you treat cities like a computer game, it can learn to clear congestion," Wischick says. But he thinks technology alone isn't the solution. Wischik believes drivers need to be prepared to change their habits and to travel outside peak traffic times. "It all comes down to -- can you change people's behavior, and can you make people willing to accept some slight change in behavior if it's imposed on them?" he says.

3. Tried & Failed in Los Angeles

First, how L.A. tried it:

Los Angeles built a “smart traffic light” system in 2013

New York Times 2013. (journalist Ian Lovett) 1 Apr 2013 “To Fight Gridlock, Los Angeles Synchronizes Every Red Light” [www.nytimes.com/2013/04/02/us/to-fight-gridlock-los-angeles-synchronizes-every-red-light.html](http://www.nytimes.com/2013/04/02/us/to-fight-gridlock-los-angeles-synchronizes-every-red-light.html) (accessed 24 Nov 2021)

Built up over 30 years at a cost of $400 million and completed only several weeks ago, the Automated Traffic Surveillance and Control system, as it is officially known, offers Los Angeles one of the world’s most comprehensive systems for mitigating traffic. The system uses magnetic sensors in the road that measure the flow of traffic, hundreds of cameras and a centralized computer system that makes constant adjustments to keep cars moving as smoothly as possible.

Backup evidence: More background details on how L.A. traffic lights work. It’s exactly what AFF is advocating

New York Times 2013. (journalist Ian Lovett) 1 Apr 2013 “To Fight Gridlock, Los Angeles Synchronizes Every Red Light” [www.nytimes.com/2013/04/02/us/to-fight-gridlock-los-angeles-synchronizes-every-red-light.html](http://www.nytimes.com/2013/04/02/us/to-fight-gridlock-los-angeles-synchronizes-every-red-light.html) (accessed 24 Nov 2021)

Now, the magnetic sensors in the road at every intersection send real-time updates about the traffic flow through fiber-optic cables to a bunker beneath downtown Los Angeles, where Edward Yu runs the network. The computer system, which runs software the city itself developed, analyzes the data and automatically makes second-by-second adjustments, adapting to changing conditions and using a trove of past data to predict where traffic could snarl, all without human involvement.

Second, How it failed:

L.A. didn’t implement “congestion pricing” toll roads, so there’s not much reduction in road congestion

New York Times 2013. (journalist Ian Lovett) 1 Apr 2013 “To Fight Gridlock, Los Angeles Synchronizes Every Red Light” [www.nytimes.com/2013/04/02/us/to-fight-gridlock-los-angeles-synchronizes-every-red-light.html](http://www.nytimes.com/2013/04/02/us/to-fight-gridlock-los-angeles-synchronizes-every-red-light.html) (accessed 24 Nov 2021) (brackets added)

Still, many residents have not yet noticed the city’s efforts to ease gridlock. Professor [James] Moore ] [professor of civil and environmental engineering at Univ. of Southern California] said that to really reduce road congestion, cities must start charging commuters to drive on the busiest corridors and freeways, which, controversially, [began recently](http://www.nytimes.com/2012/11/17/us/new-toll-jolts-la-motorists-used-to-freeways.html) on one freeway in the area. “Traffic really just defines your possibilities at any given time,” said Jeremy Fuller, 29, a graduate student at the University of California, Los Angeles, who was born and raised here. “I think it’s gotten worse since I was a kid. As the city continues to grow in population, and the infrastructure doesn’t grow, it’s just always going to get worse.”

No reduction in congestion or emissions: Even if it reduced travel time by 20%, people would drive more and fill roads back up again

New York Times 2013. (journalist Ian Lovett) 1 Apr 2013 “To Fight Gridlock, Los Angeles Synchronizes Every Red Light” [www.nytimes.com/2013/04/02/us/to-fight-gridlock-los-angeles-synchronizes-every-red-light.html](http://www.nytimes.com/2013/04/02/us/to-fight-gridlock-los-angeles-synchronizes-every-red-light.html) (accessed 24 Nov 2021) (brackets added)

James E. Moore II, a professor of civil and environmental engineering at the University of Southern California, said it was “the first U.S. deployment” of such a sophisticated system. But in the long term, he said, any traffic synchronization system — no matter how technologically advanced or comprehensive — is unlikely to keep gridlock at bay. “If we reduce average travel time in Los Angeles by 20 percent, then we will see more people traveling,” Professor Moore said. “It’s money well spent, but part of the benefit is not speed, but throughput.”

In 2017, 4 years after the smart system was completed in 2013, LA traffic was even worse

Jenny Hamel 2017 (journalist) Why is LA traffic so bad? And is it getting worse? <https://www.kcrw.com/culture/shows/curious-coast/why-is-la-traffic-so-bad-and-is-it-getting-worse> (accessed 24 Nov 2021)

Traffic in Los Angeles is getting worse and the amount of time people spend in their keeps going up year after year. The main driving force, according to UCLA urban planning professor Bryan Taylor, is that LA’s population density is increasing, which means more people and more people are sharing the same amount of space in the city.

The smart innovations were promised to reduce congestion, but it always came back

Martin Wachs, Peter Sebastian Chesney, and Yu Hong Hwang 2020 (Wachs - Distinguished Professor Emeritus of Civil and Environmental Engineering and City and Regional Planning at the University of California. He is the former Director of the University of California Transportation Center and of the Institutes of Transportation Studies at the Berkeley and Los Angeles Campuses. Chesney - completing a Ph.D. in the Department of History at UCLA; holds a certificate from UCLA’s Urban Humanities Institute. Hwang - candidate for the Master’s degree in Urban and Regional Planning and a Researcher at the UCLA Institute of Transportation Studies. He holds a degree in Materials Engineering from UCLA) Sept 2020 “A Century of Fighting Traffic Congestion in Los Angeles 1920-2020” <https://luskincenter.history.ucla.edu/wp-content/uploads/sites/66/2020/10/A-Century-of-Fighting-Traffic-Congestion-in-LA.pdf> (accessed 24 Nov 2021)

Better information guided travelers to their destinations, starting with police in blimps directing traffic and moving on to helicopters, radio traffic reports, and ultimately sensors in the pavement linked to communications centers and smartphone apps directing individual drivers. Officials sincerely informed the people they served that each innovation would fix the city's traffic congestion, but history shows that traffic flows grew each time they expanded the transportation system. Each past innovation seemed promising, but traffic is complex and it confounded every effort to reduce it. Where improvements made traffic flow more smoothly, people adjusted the times, places, and modes by which they traveled, and congestion returned.

4. Tried & Failed in Pittsburgh

Link: Pittsburgh started “smart traffic signals” in 2012 and expanded them rapidly

**Dr Stephen Smith, Ph.D. 2017 (Chief Executive Officer of Rapid Flow Technologies, provider of Surtrac, the smart traffic light system Pittsburgh implemented)** Feb 2017 “Pittsburgh Develops Smart Traffic Signals, Reduces Emissions 20%” <https://pittsburghgreenstory.com/pittsburgh-develops-smart-traffic-signals-reduces-emissions-20/> (accessed 25 Dec 2021)

Everyone knows the frustration of sitting in gridlock. Pittsburgh-based Rapid Flow Technology’s [Surtrac](https://www.surtrac.net/)has developed smart traffic signals that adapt to changing traffic conditions to keep traffic moving. These new traffic signals, sponsored through the [Traffic21 Initiative](http://traffic21.heinz.cmu.edu/) at Carnegie Mellon University, have already expanded from nine in 2012 to forty-seven this year spanning from East Liberty to Downtown Pittsburgh.

Oops: Traffic in Pittsburgh was WORSE 7 years later

KDKA News 2019 (Pittsburgh TV station) 12 Feb 2019 “New Study Says Pittsburgh Traffic Ranks Among Worst in Nation” <https://pittsburgh.cbslocal.com/2019/02/12/new-study-says-pittsburgh-traffic-ranks-among-worst-in-nation/> (accessed 25 Dec 2021)

A new study says that Pittsburgh has some of the worst traffic in the country. The study found that Pittsburghers spend an average of more than five days a year sitting in traffic. [**END QUOTE**] Congestion costs Americans, according to new study from Inrix that found billions are lost from time in traffic. Pittsburghers know why we are in the rankings. “Just the geography of the area is a problem. You know, the rivers, the hills, all that kind of stuff,” said Lorin Lacey, of McDonald. [**THEY CONTINUE LATER IN THE CONTEXT QUOTE**:] Of the 10 most congested urban areas in the U.S., Pittsburgh ranked seventh, up from number 11 last year, which is a five percent increase.

5. Tried & Failed in Phnom Penh (pronounced “Puh-nom Pen”), Cambodia

Link: Japan started “smart traffic light” system in the capital of Cambodia in 2014

[SEBASTIAN STRANGIO](https://nextcity.org/urbanist-news/author/sebastian-strangio) 2014 (journalist) Japan to Install “Smart” Traffic Lights Throughout Cambodia’s Capital <https://nextcity.org/urbanist-news/japan-jica-install-smart-system-of-traffic-lights-phnom-penh> (accessed 25 Dec 2021)

Japan has worked to alleviate Cambodia’s traffic woes before, and as the gridlock worsens, is jumping back into the fray with a total overhaul of the capital’s traffic light system. Over the next few years, Tokyo’s development arm, the Japan International Cooperation Agency (JICA), hopes to replace the traffic lights at Phnom Penh’s 69 controlled intersections and add around 30 more, then link the entire system together with a computerized central control station.

Oops: 7 years later in 2021, traffic was worse, despite all the money spent on improvements

Ses Aronsakda 2021. (journalist) 20 May 2021 SOUTHEAST ASIA GLOBE “Phnom Penh should be a city designed for humans, not cars” <https://southeastasiaglobe.com/phnom-penh-cars/> (accessed 25 Dec 2021)

Additionally, despite cities spending billions to build and enhance vehicle infrastructure, traffic congestion has only become worse in the most car-dependent cities. Larger roads only create more traffic demand – and thus [attract even more traffic](https://archive.curbed.com/2020/3/6/21166655/highway-traffic-congestion-induced-demand). Phnom Penh is no different, with rush hour each day bringing with it major arteries going in and out of the city clogged with traffic.

Backup evidence: Yes, Japan did actually complete installation of the system in 2019

Lim Tola 2019 (journalist) 3 May 2019 “When the light is red, the fool looks at the sky” <https://cambodianess.com/article/when-the-light-is-red-the-fool-looks-at-the-sky> (accessed 25 Dec 2021)

To remedy the situation, the authorities have, with Japanese-cooperation support, implemented a bold traffic management program. Completed last year, this program materialized with the introduction of a state-of-the-art traffic signal management system as well as by putting in place pavement markings and median dividers.

6. Lack of skilled professionals

Link: Traffic management will require a big increase in skilled and experienced professionals

Naveen Joshi 2019 (Founder and CEO of Allerin, a software solutions provider) TRAFFIC MANAGEMENT WITH MODERN TECHNOLOGIES 28 Apr 2019 <https://www.bbntimes.com/technology/traffic-management-with-modern-technologies> (accessed 23 Nov 2021)

Traffic management authorities will need to fulfill [various requirements before deploying any modern technology](https://www.allerin.com/blog/make-sure-you-meet-these-5-requirements-before-you-adopt-any-modern-technology). Numerous technicalities are involved in the adoption process which can only be addressed by skilled and experienced professionals. Hence, hiring experts who can strategize and help execute the amalgamation of laws, rules, and technology around traffic management is essential. Such professionals will allow informed decision-making and planning of infrastructure such as zoning and road planning, amongst other construction-related issues.

Failure: They don’t exist. Professionals in AI are in short supply and the shortage is getting worse

Jair Ribeiro 2021 (AI specialist with Kimberly-Clark; former AI project manager at IBM) 31 May 2021 This is a great moment to look for a new job in Artificial Intelligence <https://towardsdatascience.com/this-is-a-great-moment-to-look-for-a-new-job-in-artificial-intelligence-c34df6efb9c3> (accessed 20 Nov 2021)

The recent explosion in data volume has created an ideal environment for Artificial Intelligence and Machine Learning solutions to find their way. Professionals with the skills to develop AI solutions, on the other hand, are still in short supply, and the trend is for this gap to widen.

 Demand for AI professionals exceeds supply even before the AFF plan kicks in and creates new demand

Jair Ribeiro 2021 (AI specialist with Kimberly-Clark; former AI project manager at IBM) 31 May 2021 This is a great moment to look for a new job in Artificial Intelligence <https://towardsdatascience.com/this-is-a-great-moment-to-look-for-a-new-job-in-artificial-intelligence-c34df6efb9c3> (accessed 20 Nov 2021)

To be considered an AI professional, in general, is required to master a variety of practical activities like analysis and forecasting, detection of anomalous events, such as fraud in bank transactions, image processing to detect objects/people, analysis of feelings from texts, and simulation of scenarios using AI to help in decision making and chatbots, for example. [**END QUOTE**] AI Professionals should also learn how to use popular tools such as TensorFlow, Sciki-Learn, Keras, Spark, Hadoop, Hive, BigQuery, Tableau, and PowerBi. Python is considered the primary programming language for AI development.
Conclusion
Companies need to train personnel and attract talents to face the enormous challenge represented by a talent shortage. At the same time, the more companies in all segments adopt AI and robotics technologies, the more they see benefits and realize how much their functions can be redesigned. [**HE GOES TO WRITE QUOTE**:] The demand for AI talent is increasing. There is a gap between supply and demand, with several functions available to each truly trained AI professional, the ones who can help companies capitalize on AI’s potential.

7. Cost

Two things block rollout of smart traffic lights (as of March 2021): High cost, and more research needed

IAES International Journal of Artificial Intelligence 2021 (IAES= Institute of Advanced Engineering and Science. Authors were: A’isya Nur Aulia Yusuf, Ajib Setyo Arifin, Fitri Yuli Zulkifli, who are with Department of Electrical Engineering, Universitas Indonesia) “Recent development of smart traffic lights” March 2021 <https://www.researchgate.net/publication/349891471_Recent_development_of_smart_traffic_lights/link/60463bc94585154e8c875c87/download> (accessed 25 Dec 2021)

Although the development of smart traffic light is able to provide convenience such as reducing

travel time and stops at intersections, there is one problem that hinders the adaptation of smart traffic light,

namely the costs required for signal control devices, communication networks and periodic updates to

regulate systems that are able to adapt to traffic conditions. This adaptive system requires periodic traffic research and recalibration. For further technological developments, both in terms of industry and academic research, it is expected that smart traffic lights will be able to operate in accordance with changing traffic conditions through high-speed communication. Further development of the algorithm is required to be able to integrate position, speed and queue data received from vehicles as well as sensor and transmitter infrastructure, to make predictions and strategies to monitor, learn and respond to traffic conditions optimally.

“No Traffic” (company that develops AI traffic lights) says they will cost $115,000 each

Dan Carney 2021 (journalist) Time Wasted at Traffic Lights Is Astounding. You Could Get Some of it Back 5 May 2021 <https://www.designnews.com/automation/time-wasted-traffic-lights-astounding-you-could-get-some-it-back> (accessed 21 Nov 2021)

NoTraffic estimates the capital expenditure to equip a traditional intersection is $115,810 and the annual operating cost is $10,050. NoTraffic says its technology offer the opportunity for a reduction in operating cost of nearly 75 percent compared to conventional traffic signals.

Toronto experience confirms: They cost between $100,000 to $150,000 each

Canadian Broadcasting Corp. 2017. (public media broadcasting organization owned by Canadian government) “Toronto's new 'smart' traffic lights will sense congestion and adjust themselves” <https://www.cbc.ca/news/canada/toronto/smart-traffic-signals-1.4417573> (accessed 25 Dec 2021) (brackets added)

The new signal is governed by U.S. technology called InSync, which watches the intersection via video and senses when long lines of cars are lined up at the light.   InSync signals will be installed in nine other locations, stretching south on Yonge to Castlefield Avenue. In Scarborough, different technology is being used at 12 intersections on Sheppard Avenue East between Neilson and Meadowvale Roads. Called SCATS, it uses radar to measure traffic flow. Those installations will take place over "the next few weeks," [Toronto Mayor John] Tory said, and it will cost between $100,000 and $150,000 per intersection.

300,000 traffic lights in the U.S.

Douglas McIntyre 2018 (journalist) 10 Dec 2018 “The Traffic Light Turns 150 Years Old” <https://247wallst.com/economy/2018/12/10/the-traffic-light-turns-150-years-old/> (accessed 21 Nov 2021)

How many traffic lights are there in the United States 150 years after the device was invented? According to the United States Access Board, more than 300,000. As a general rule of how they should be placed, the organization recommends there be one signalized intersection per 1,000 in population.

Total cost: $34.7 billion

300,000 x $115,810 = $34,743,000,000

Cost prohibitive. Cities can’t afford it and “smart” traffic signals are a lot more expensive than traditional ones

Applied Information 2019 (developer of connected, intelligent transportation system) “What You Need to Know About the Smart Stop Lights Act of 2019” 5 Dec 2019 <https://appinfoinc.com/smart-stop-lights-act-of-2019/> (accessed 24 Nov 20210

The biggest hurdle to adopting smart traffic controllers is allocating budget. According to [Truth in Accounting](https://www.truthinaccounting.org/library/doclib/2019-Financial-State-of-the-Cities-Report--1.pdf), more than 80 percent of the country’s 75 most populous cities don’t have enough money to pay the bills and balance the budget. Unfunded debt from these cities amounted to nearly $330 billion, which leaves little wiggle room for investing in new technology. Smart traffic signals may provide a long-term return on investment, but it’s hard to justify the higher price tag when there are other pressing and underfunded projects over the short term. Smart traffic signals are typically a lot more expensive than their basic counterparts, while there are few government programs incentivizing or subsidizing their use.

DISADVANTAGES

1. Starvation from lower crop yields

Link: AFF claims to reduce atmospheric carbon

It’s one of their advantages

Link: CO2 is plant food. It increases agricultural productivity

Dr. Harrison Schmitt and Dr. William Happer 2013. (Schmitt – PhD in geology; retired NASA astronaut, university professor, former U.S. senator from New Mexico. Happer – PhD; Professor of Physics, Emeritus, at Princeton University ) “CO2 myth busted: Why we need more carbon dioxide to grow food and forests” https://www.researchgate.net/publication/307218166\_CO2\_myth\_busted\_Why\_we\_need\_more\_carbon\_dioxide\_to\_grow\_food\_and\_forests\_httpwwwnaturalnewscom039720\_carbon\_dioxide\_myths\_plant\_nutritionhtml/link/606cbf114585159de5011066/download

Of all of the world's chemical compounds, none has a worse reputation than carbon dioxide. Thanks to the single-minded demonization of this natural and essential atmospheric gas by advocates of government control of energy production, the conventional wisdom about carbon dioxide is that it is a dangerous pollutant. That's simply not the case. Contrary to what some would have us believe, increased carbon dioxide in the atmosphere will benefit the increasing population on the planet by increasing agricultural productivity.

Link: More CO2 would help feed earth’s rising population and reduce food shortages

Dr. Harrison Schmitt and Dr. William Happer 2013. (Schmitt – PhD in geology; retired NASA astronaut, university professor, former U.S. senator from New Mexico. Happer – PhD; Professor of Physics, Emeritus, at Princeton University ) “CO2 myth busted: Why we need more carbon dioxide to grow food and forests” https://www.researchgate.net/publication/307218166\_CO2\_myth\_busted\_Why\_we\_need\_more\_carbon\_dioxide\_to\_grow\_food\_and\_forests\_httpwwwnaturalnewscom039720\_carbon\_dioxide\_myths\_plant\_nutritionhtml/link/606cbf114585159de5011066/download

Crop yields in recent dry years were less affected by drought than crops of the dust-bowl droughts of the 1930s, when there was less carbon dioxide. Nowadays, in an age of rising population and scarcities of food and water in some regions, it's a wonder that humanitarians aren't clamoring for more atmospheric carbon dioxide.

Impact: Millions will starve without increasing agricultural productivity

United Nations Sustainable Development Goals 2015. (published by the UN; article is undated but references events in 2015) <https://unric.org/en/sdg-2/> (accessed 21 Nov 2021)

With more than a quarter of a billion people potentially at the brink of starvation, swift action needs to be taken to provide food and humanitarian relief to the most at-risk regions. At the same time, a profound change of the global food and agriculture system is needed if we are to nourish the more than 820 million people who are hungry and the additional 2 billion people the world will have by 2050. Increasing agricultural productivity and sustainable food production are crucial to help alleviate the perils of hunger.

2. Hacking

“Intelligent” traffic lights can be hacked, leading to widespread traffic jams

Andy Greenberg 2020 (journalist) 5 Aug 2020 “Dutch Hackers Found a Simple Way to Mess With Traffic Lights” <https://www.wired.com/story/hacking-traffic-lights-netherlands/> (accessed 23 Nov 2021)

At the Defcon hacker conference Thursday, Dutch security researchers Rik van Duijn and Wesley Neelen will present their findings about vulnerabilities in an "intelligent transport" system that would allow them to influence traffic lights in at least 10 different cities in the Netherlands over the internet. Their hack would spoof nonexistent bicycles approaching an intersection, tricking the traffic system into giving those bicycles a green light and showing a red light to any other vehicles trying to cross in a perpendicular direction. They warn that their simple technique—which they say hasn't been fixed in all the cases where they tested it—could potentially be used to annoy drivers left waiting at an empty intersection. Or if the intelligent transport systems are implemented at a much larger scale, it could potentially even cause widespread traffic jams.

Every intersection can be hacked from anywhere in the world

Andy Greenberg 2020 (journalist) 5 Aug 2020 “Dutch Hackers Found a Simple Way to Mess With Traffic Lights” <https://www.wired.com/story/hacking-traffic-lights-netherlands/> (accessed 23 Nov 2021)

Neelen and van Duijn's technique works remotely over the internet, so it can be carried out at many intersections simultaneously, from anywhere in the world. "This attack sounds very easy to do," Cerrudo says. "It's very cool that you can just reverse engineer an app and start sending fake locations about ghost bikes and cause problems with traffic."