

This Room is Equipped With
Edison Electric Light

**Do not attempt to light with
match. Simply turn key
on wall by the door.**

The use of Electricity for lighting is in no way harmful
to health, nor does it affect the soundness of sleep.

Wind Resource Data

What's needed

a biased opinion

Thank you

for giving me this opportunity
to participate
in helping
to grow
the small wind market.



WYOMING WIND SOCK

STRENGTH OF WIND FROM CHAIN ANGLE

0° BROKEN—NOTIFY METEOROLOGIST

30° FRESH BREEZE

45° GENTLE ZEPHYR

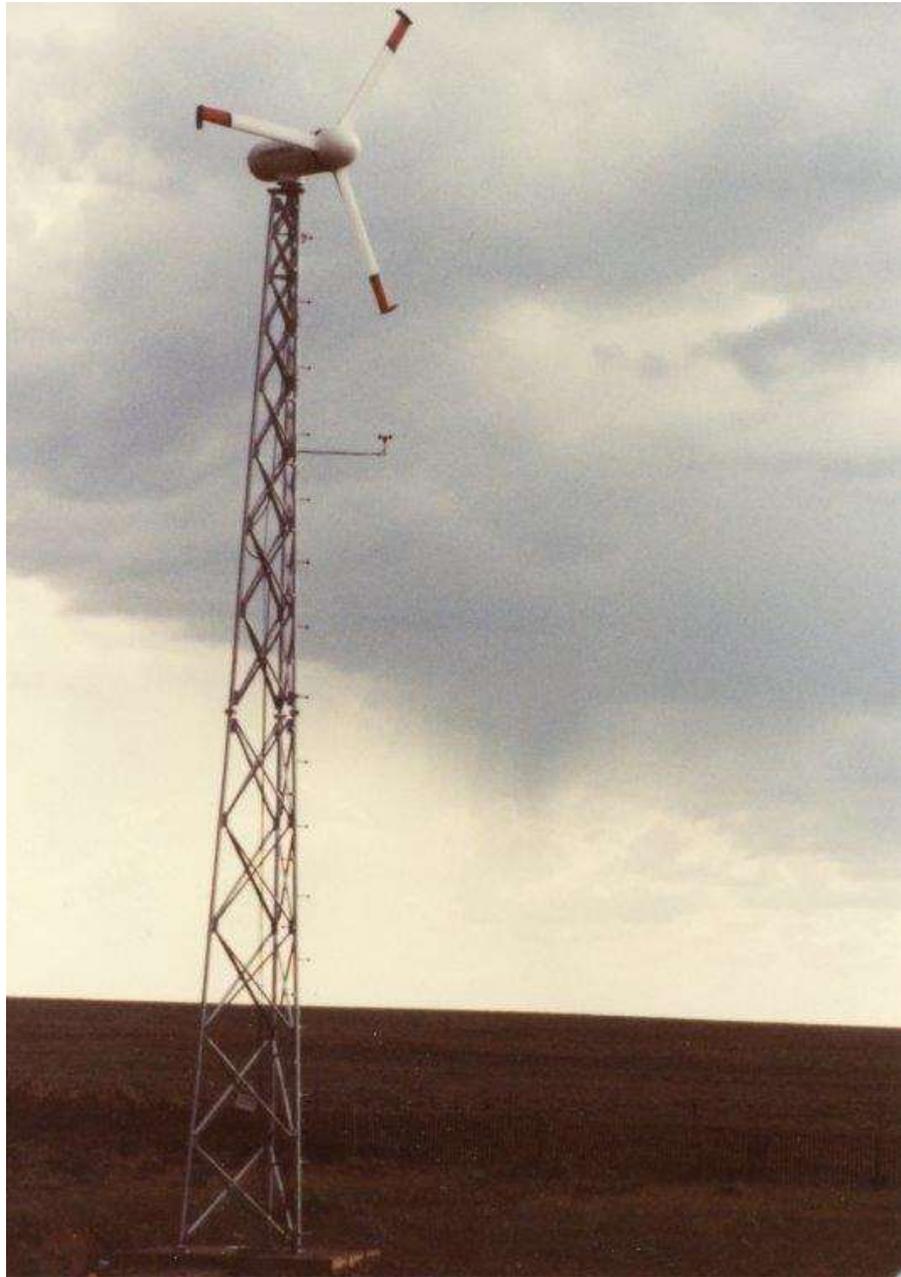
60° HURRICANE IN AREA

75° BEWARE OF LOW FLYING TRAINS

90° WELCOME TO BIG WONDERFUL WYOMING

Who am I to be here today?

- Started in Wyoming, Colorado
- In 1982, installed my first turbine – an Enertech 1500



Helped install over 40 turbines

Worked with two family firms-

Independent Electric and

Sunshine Power Company

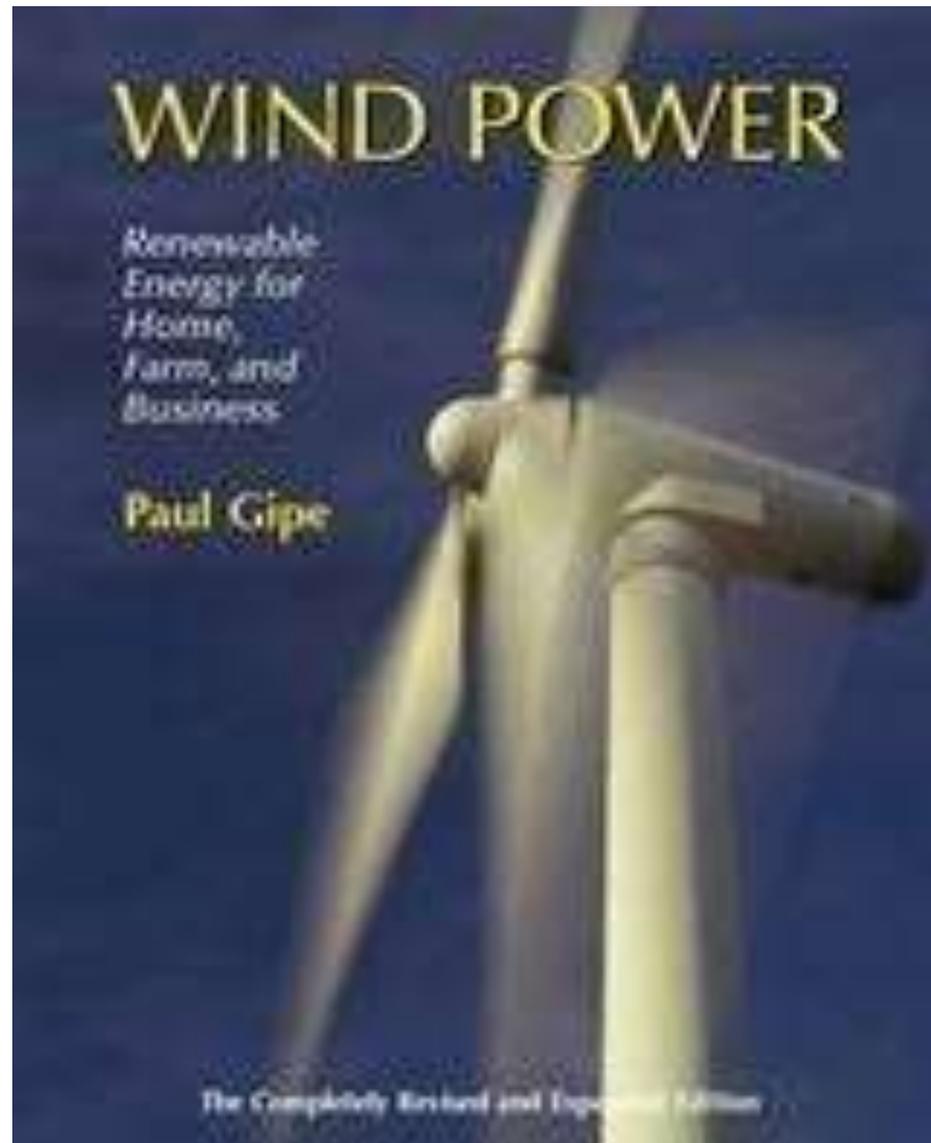








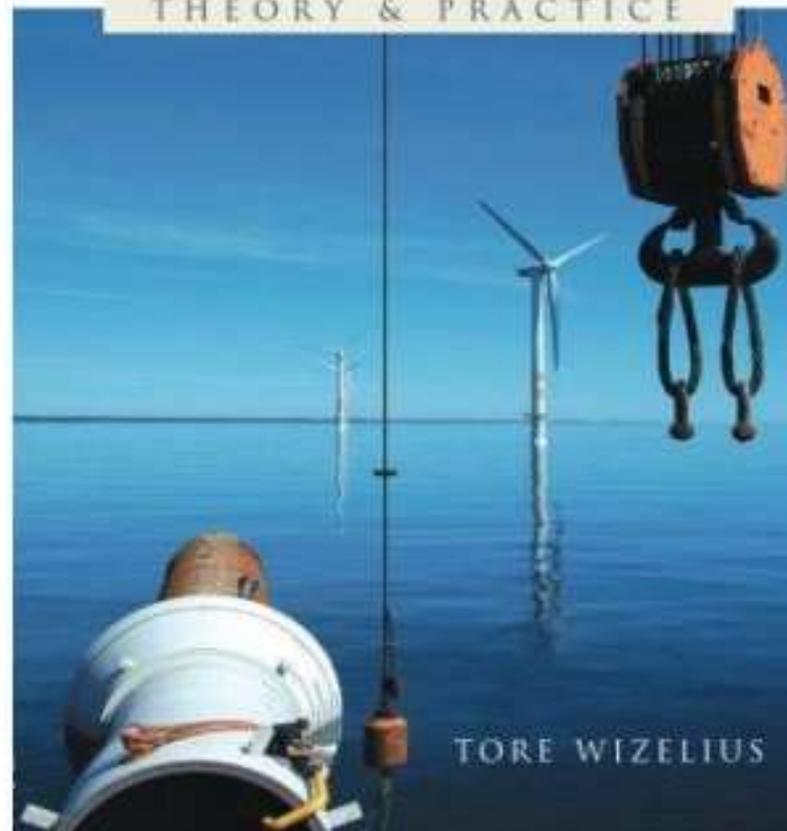
Exciting books
about Wind Energy
were published
that re-awoke my interest.



Paul Gipe 2004

DEVELOPING
WIND POWER
PROJECTS

THEORY & PRACTICE



Tore Wizelius 2006

- Completed Wind Power Technology certificate from Gotland University, Visby, Sweden
now part of Uppsala University
- MREA wind courses in wind power and site assessment
- Founded *The WindWay* in 2004

*Why aren't we
installing thousands
of
turbines?*

Here's my opinion

Is there a market for small wind?

Is there land enough for small wind?

The rough facts on the market

126 million households in the US

28 small business

18,500 firms >500 employees

So 154 million possible customers

Of these,

1.4 million households >\$5 million income

156,000 Households >\$25 million

If only 1% of the possible customers had viable sites that's 1.5 million small wind turbines or larger.

If 10% of the wealthier households were customers, that's 150,000 turbines

Yes, there's a market

Top 10 landowners in the US

John Malone	2.3 million acres
Ted Turner	2.0 million acres
Curly Emmerson	1.9 million acres
Brad Kelly	1.7 million acres
Mark Reed	1.37 million acres
The Irvings	1.2 million acres
Henry Singleton	1.1 million acres
The Kings	0.9 million acres
Stan Kroenke	0.865 million acres
David Pingree	0.830 million acres
Total	14.065 million acres

The top 50 landowners in total control 27 million acres

Where is this land?

In some of the windiest parts of the US

Is there a market?

YES



Assessing the Future of Distributed Wind: Opportunities for Behind-the-Meter Projects

Eric Lantz, Benjamin Sigrin, Michael Gleason,
Robert Preus, and Ian Baring-Gould
National Renewable Energy Laboratory

NREL releases

Wind power is one of the fastest growing sources of new electricity generation in the United States. Cumulative installed capacity was more than 74,000 megawatts (MW) at year-end 2015 and wind power supplied 4.7% of total 2015 U.S. electricity generation. Despite the growth of the wind power industry, the distributed wind market has remained limited.

The addressable resource potential of distributed wind is large, potentially supporting millions of systems and thousands of gigawatts (GW) of power production capacity

In aggregate terms, the addressable resource potential for distributed wind exceeds the total U.S. electricity demand.

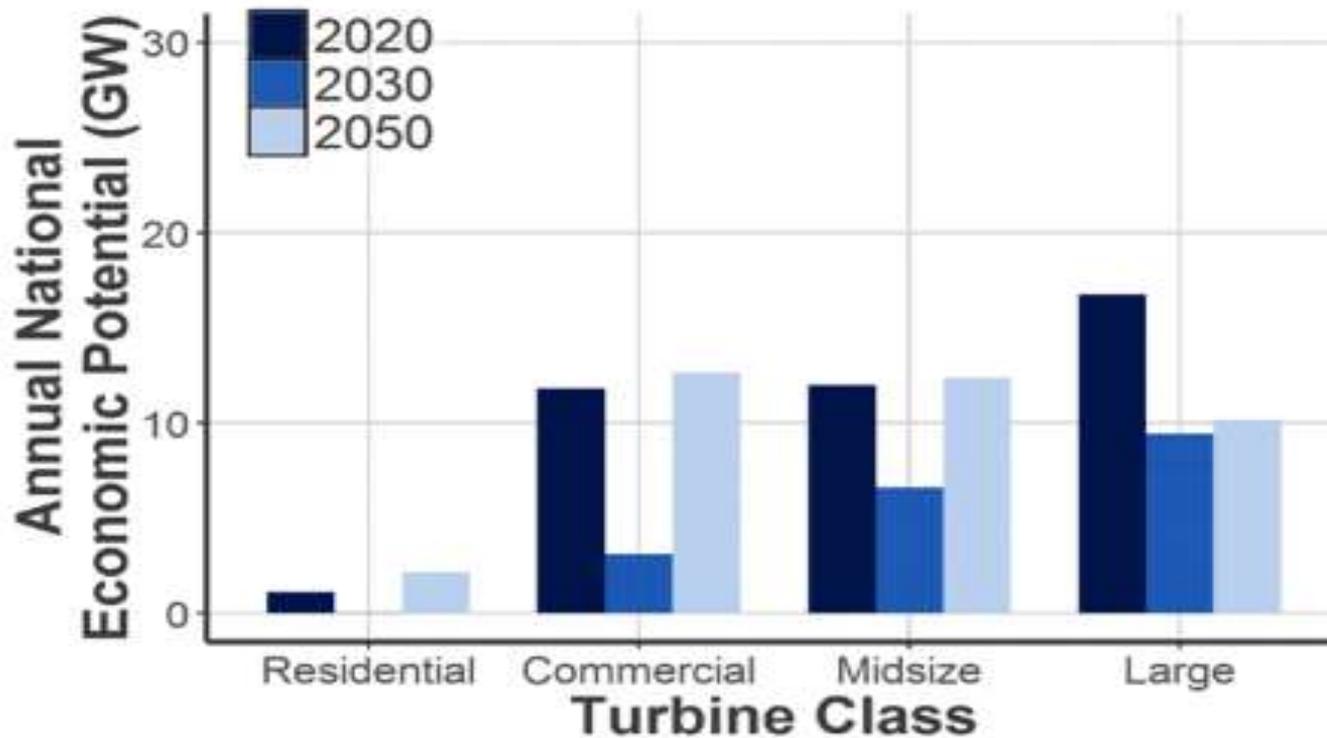


Figure 16. Economic potential by turbine class (Reference scenario)

Growth in the residential turbine size class is relatively muted in this low growth scenario

According to the [2010 U.S. Census](#), approximately 21 million U.S. homes are built on sites that are 1 acre and larger and 19.3% of the U.S. population lives in rural areas, making residential distributed wind a potential key element of the wind energy mix in the United States.

YES, there's land and customers

Are there
good small wind turbines
out there??

Certified Turbines in the United States

Applicant	Turbine	Date of Certification	Rated Annual Energy ¹ @ 5 m/s (kWh)
Bergey WindPower	Excel 10 ⁴	11/16/2011	13,800
Eocycle Technologies, Inc.	EO20 ⁵	3/21/2017	64,920
Eveready Diversified Products	Kestrel e400nb ⁴	2/14/2013	3,930
Kingspan Environmental	KW6 ⁴	6/17/2013	8,950
Lely Aircon B.V.	LA10 ⁴	1/13/2017	17,500
Lely Aircon B.V.	LA30 ⁴	1/13/2017	48,800
Osiris Technologies	Osiris 10 ⁸	9/27/2013	23,700
Pika Energy	T701 ⁴	1/25/2016	2,420
Sonkyo Energy	Windspot 3.5 ⁶	10/30/2012	4,820
Sumec Hardware & Tools Co. LTD	PWB01-30-48 ⁶	5/20/2013	2,920
Sumec Hardware & Tools Co. LTD	PWA03-44-250 ⁶	12/26/2012	6,400
Sumec Hardware & Tools Co. LTD	PWB02-40-48 ⁶	5/20/2013	4,660
Sumec Hardware & Tools Co. LTD	PWA05-50-280 ⁶	12/26/2012	9,240
Xzeres Wind Corporation	442SR ⁴	2/6/2015	16,700
Xzeres Wind Corporation	Skystream 3.7 ⁴	12/19/2011	3,420

YES, there are good, reliable turbines out there...

The Nordic Folkecenter reports 104 companies in 28 countries produce 302 different turbines less than 50kW

So why aren't we installing thousands of turbines?

What do the experts say?



Distributed Wind Resource Assessment: State of the Industry

Jason Fields, Heidi Tinnesand, and
Ian Baring-Gould
National Renewable Energy Laboratory

Regardless of how well designed a turbine may be or efforts to reduce deployment costs, if it is sited improperly the performance will likely be less than desired by stakeholders. By improving the siting and prediction process, we can positively impact the baseline distributed wind fleet performance across all projects.

Prioritized Challenges

Data Access: Expand the availability of data accessible by the public

Develop and populate a user-friendly data-sharing platform that provides access to publically available measurement data,

How to get reliable
wind resource data
to the people?

Disclaimer

This is an idea to bring wind data to the masses-

I have no stake, investment or financial interest in this product-
it's a neat gadget that could help

Pioupiou V2

open source wind resource monitoring

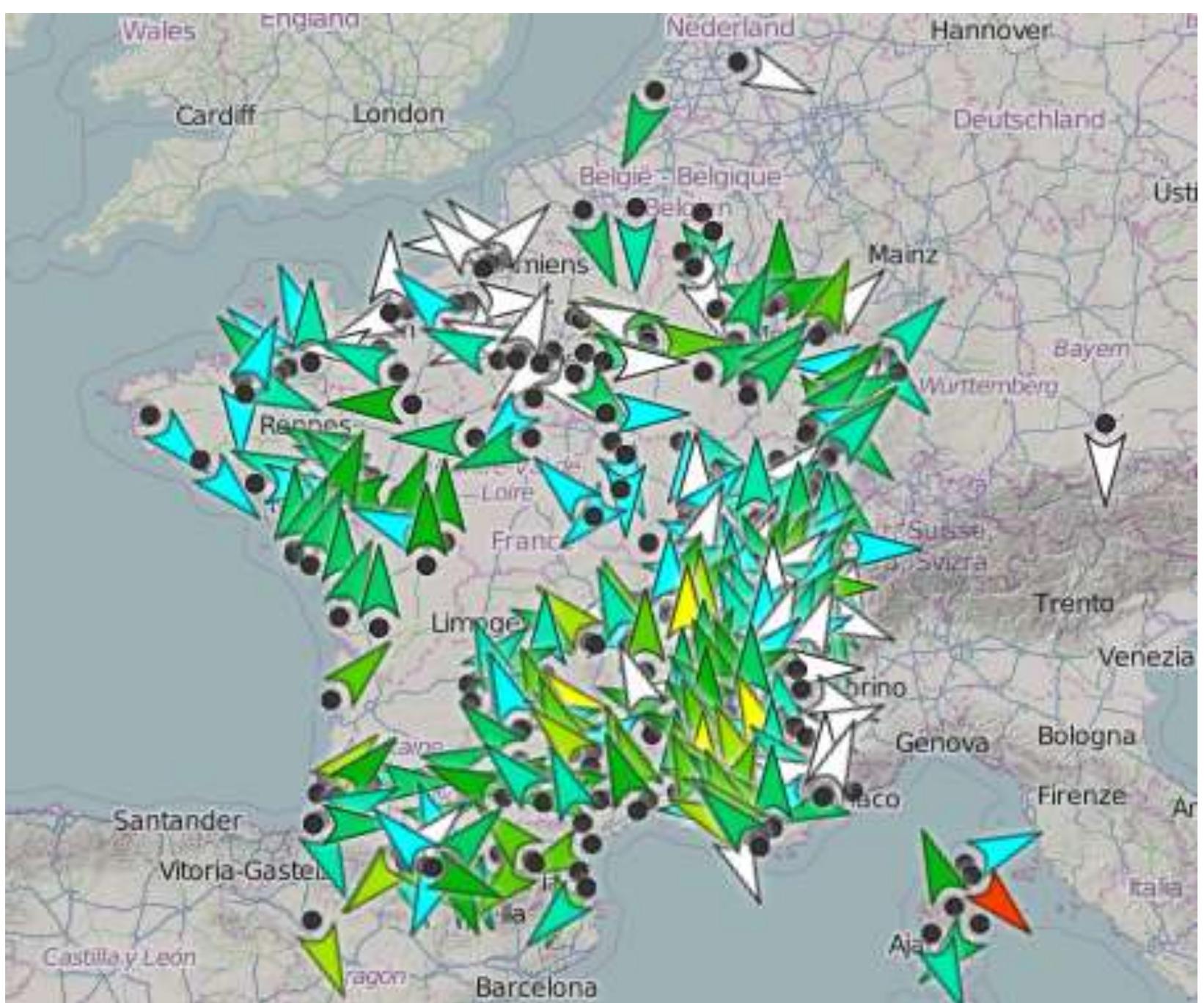




Waterproof,
UV resistant,
cellular,
solar panel in tail,
rechargeable
battery,
integrated GPS,
hundreds installed

What if a state or the country had
this many sensors installed?

<https://pioupiou.com/en/map>



What if we had this in the U.S.?

THANK YOU!!