

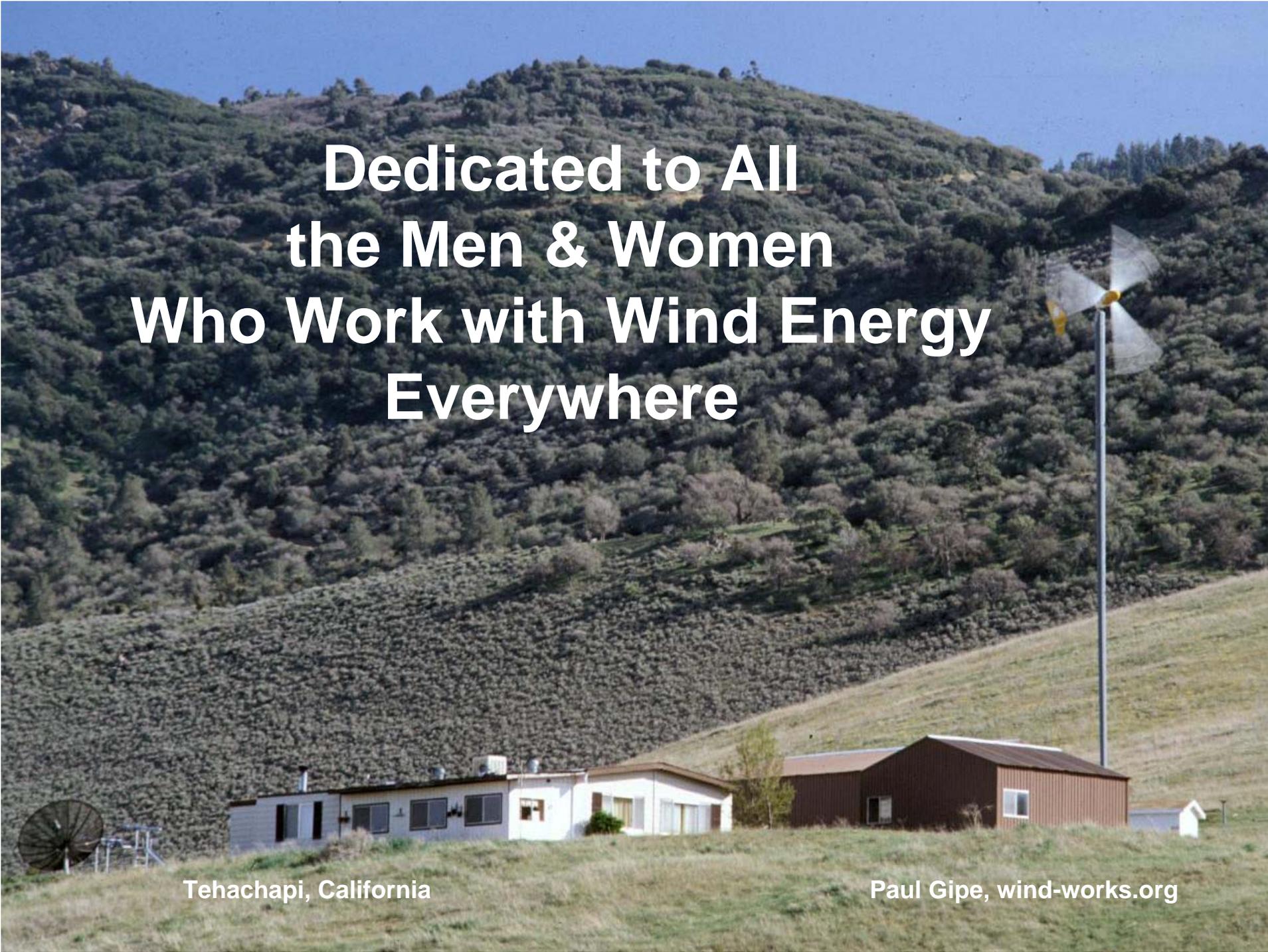
Carleton College V82, Northfield, Minnesota

Wind—the Breath of Life or the Kiss of Death

Analysis of Wind Energy Fatalities
By
Paul Gipe



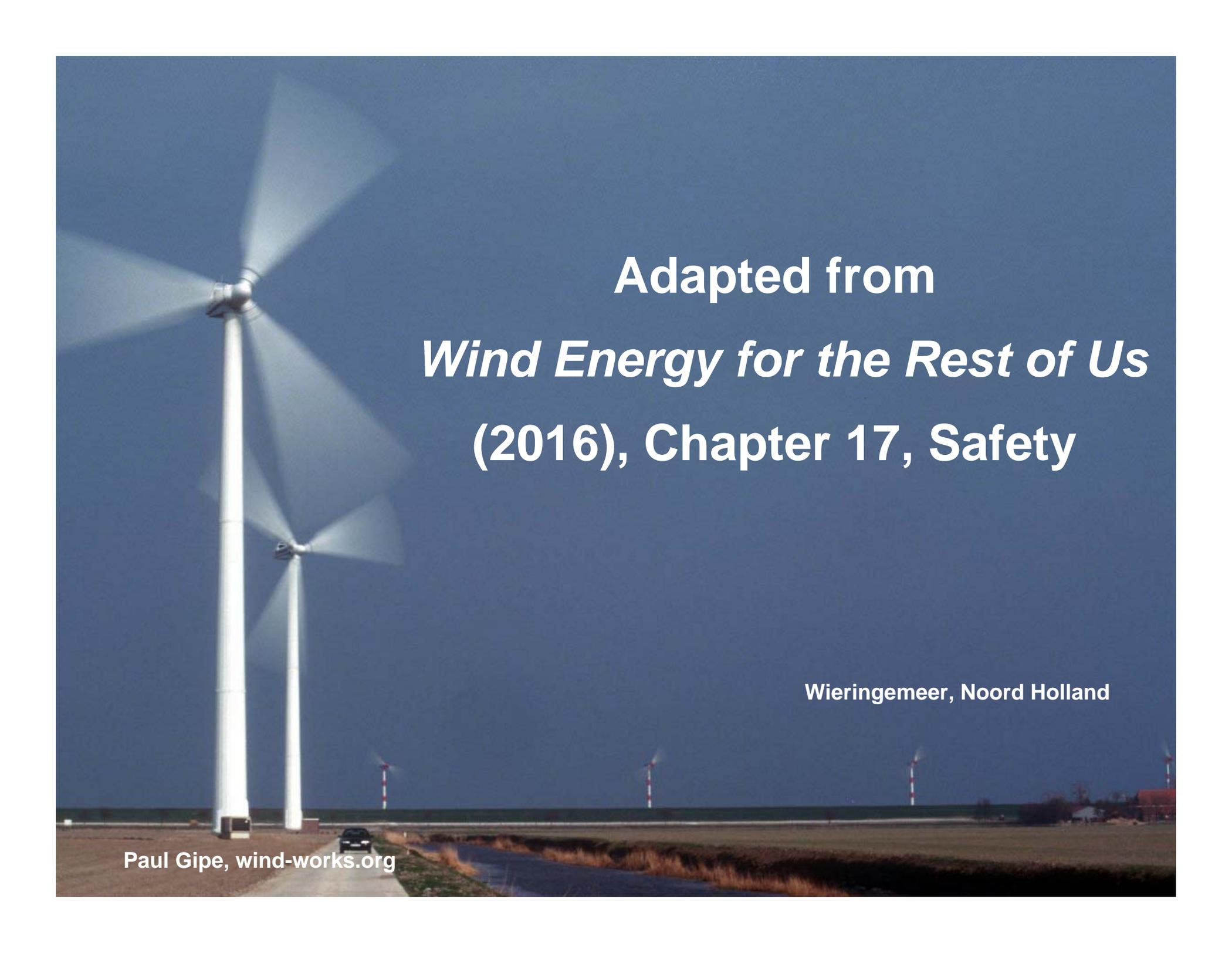
Paul Gipe, wind-works.org



**Dedicated to All
the Men & Women
Who Work with Wind Energy
Everywhere**

Tehachapi, California

Paul Gipe, wind-works.org



Adapted from
Wind Energy for the Rest of Us
(2016), Chapter 17, Safety

Wieringemeer, Noord Holland

Why Wind?

“A Gift from the Heavens”

--Franz Alt, Theologian, Dedication of
Dardesheim

**“Me, I Work with the Mistral,
the Breath of the Good Lord”**

--Alphonse Daudet, *Lettres de mon
Moulin*

Druiberg--Brocken

Paul Gipe, wind-works.org

Dardesheim, Germany



Why Wind?

Manawatu Gorge, NZ

**To Protect Life—Not Take it
Wind -- “Relatively” Benign**

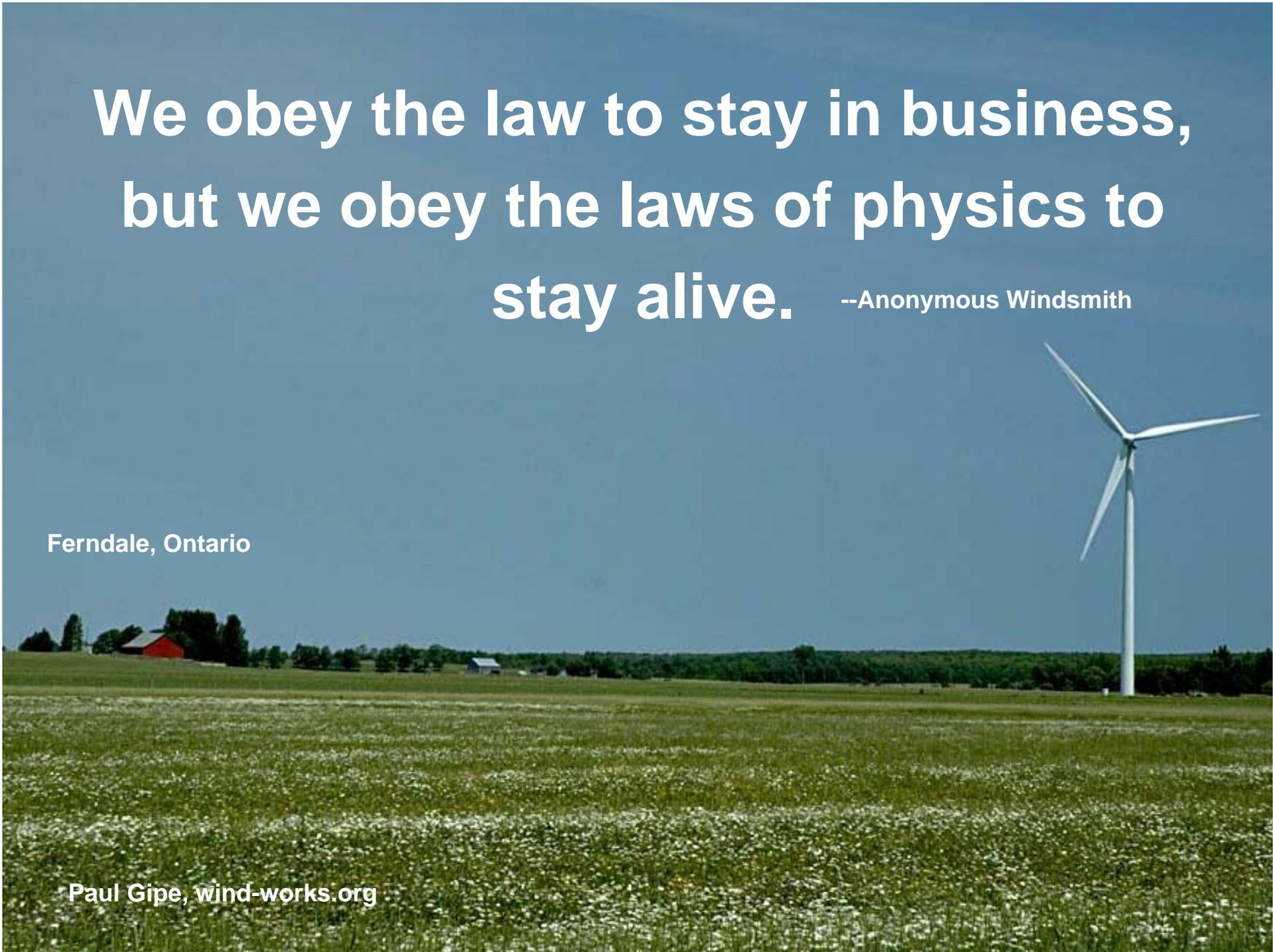
Paul Gipe, wind-works.org



**We obey the law to stay in business,
but we obey the laws of physics to
stay alive. --Anonymous Windsmith**

Ferndale, Ontario

Paul Gipe, wind-works.org



Deaths Database

1980-2020 = 40 years!

Began with a Colleague's Death

Paul Gipe, wind-works.org

Hohe Westerwald, Germany

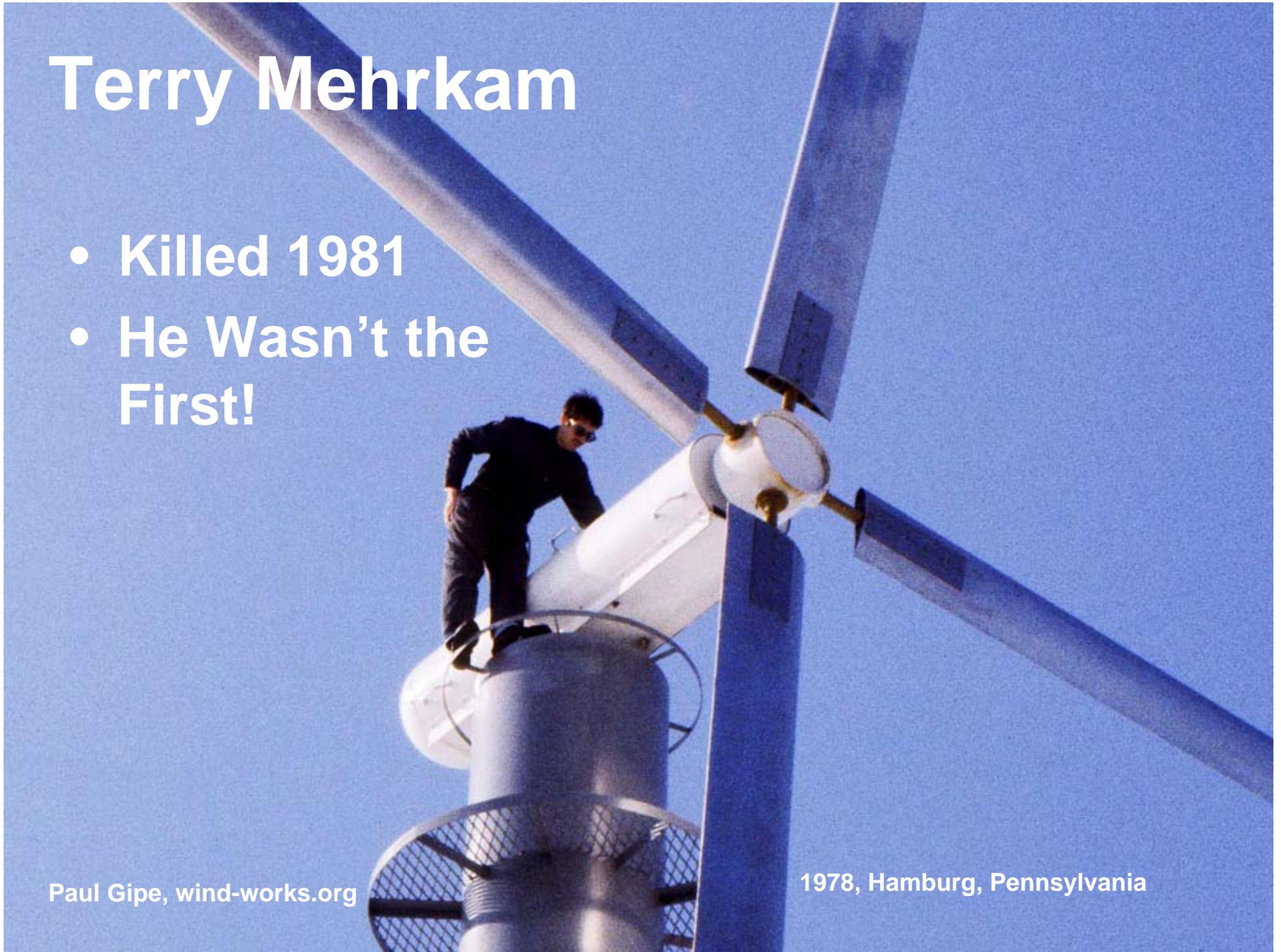


Terry Mehrkam

- Killed 1981
- He Wasn't the First!

Paul Gipe, wind-works.org

1978, Hamburg, Pennsylvania

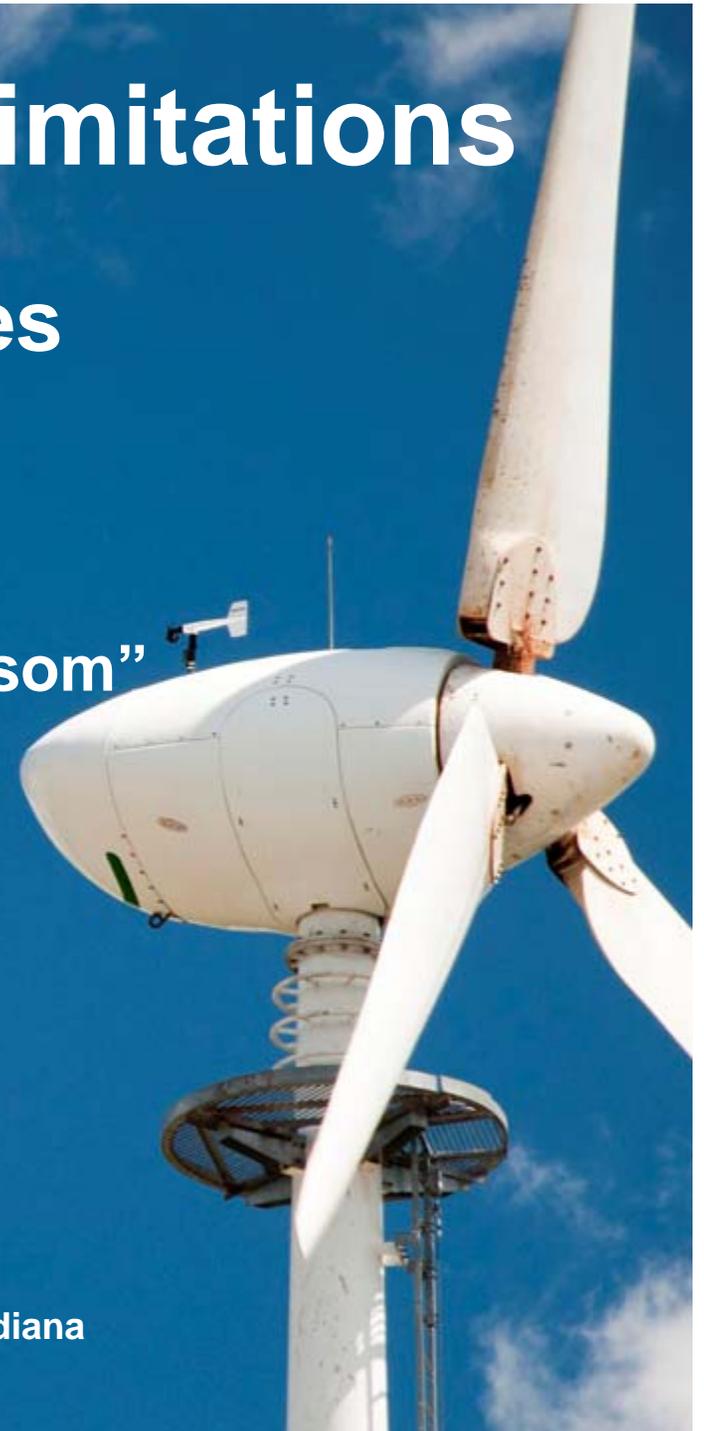


Deaths Database: Limitations

- **Deaths Only—Not Injuries**
- **English Search Only**
- **Dependent Upon Tips**

What Comes “Over the Transom”

- **No Longer Active**
Looking to Hand This Over
- **Effectively “Ad Hoc”**





Safety Practices Now Standard

It Wasn't Always So!

Ydby, Denmark

Paul Gipe, wind-works.org

What's Wrong with this Picture?

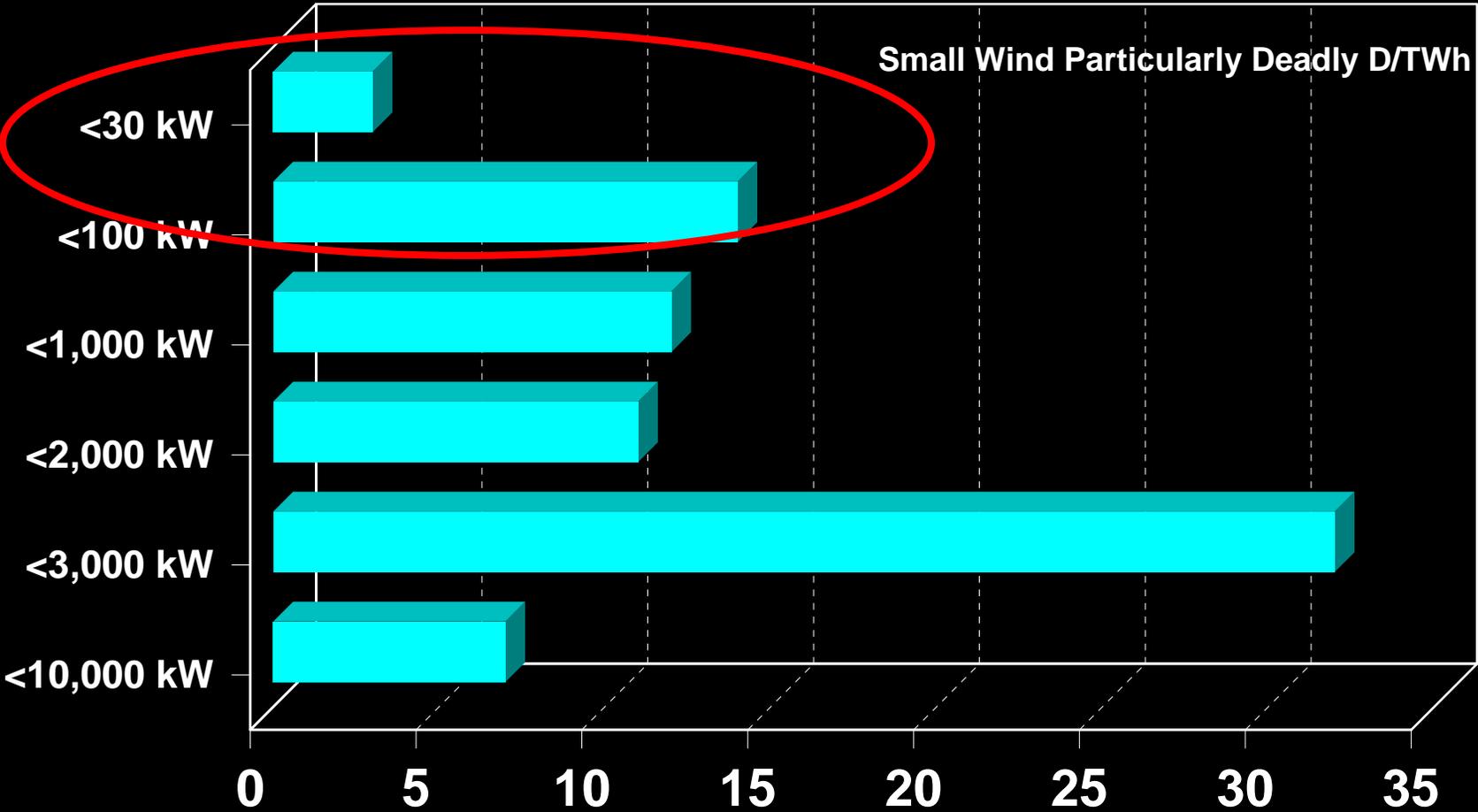
- No Fall-Arrest System
- No Work Platform
- No Anchors
- No Training



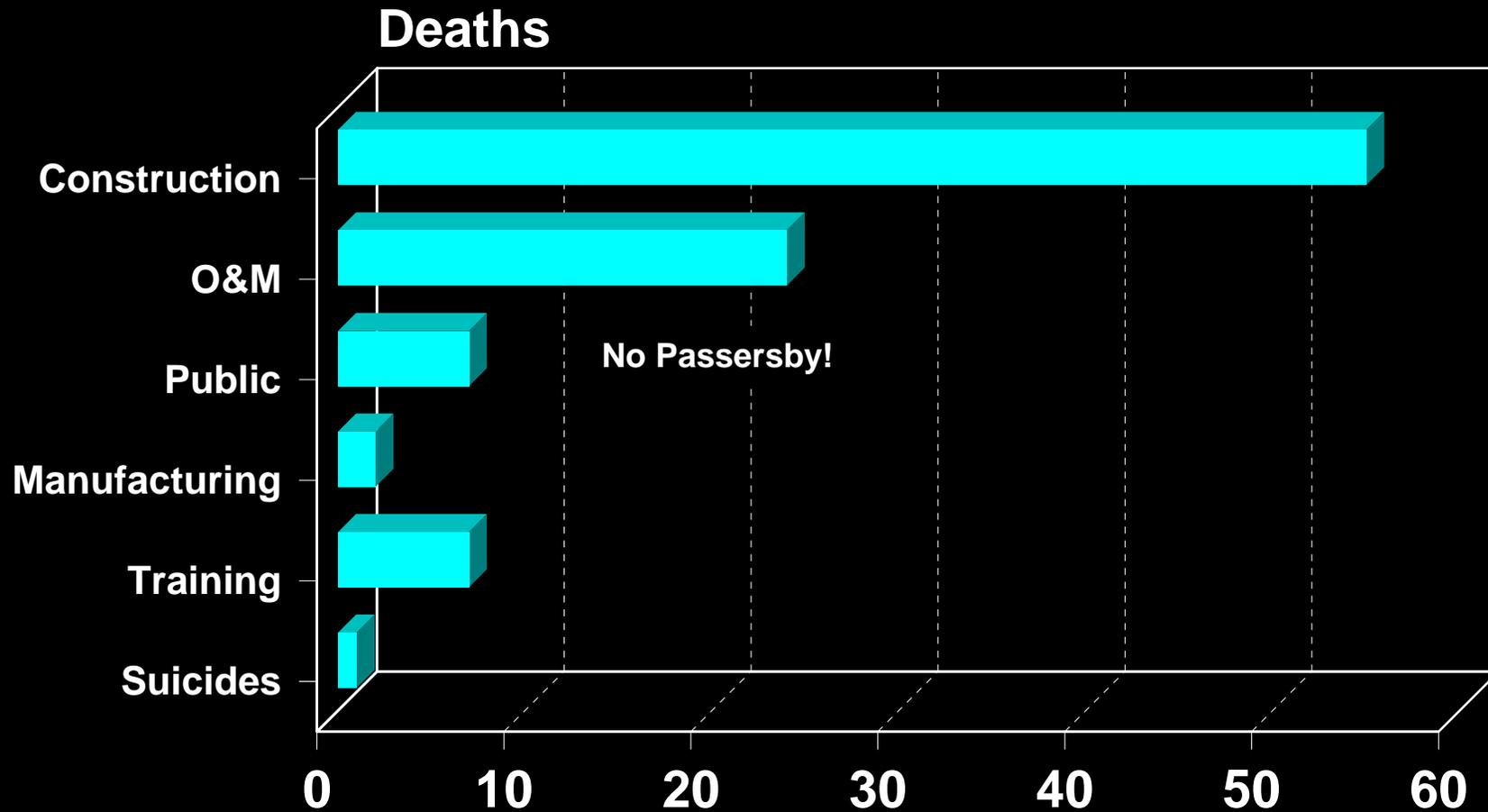
Paul Gipe, wind-works.org

Canyon, Texas, 1979

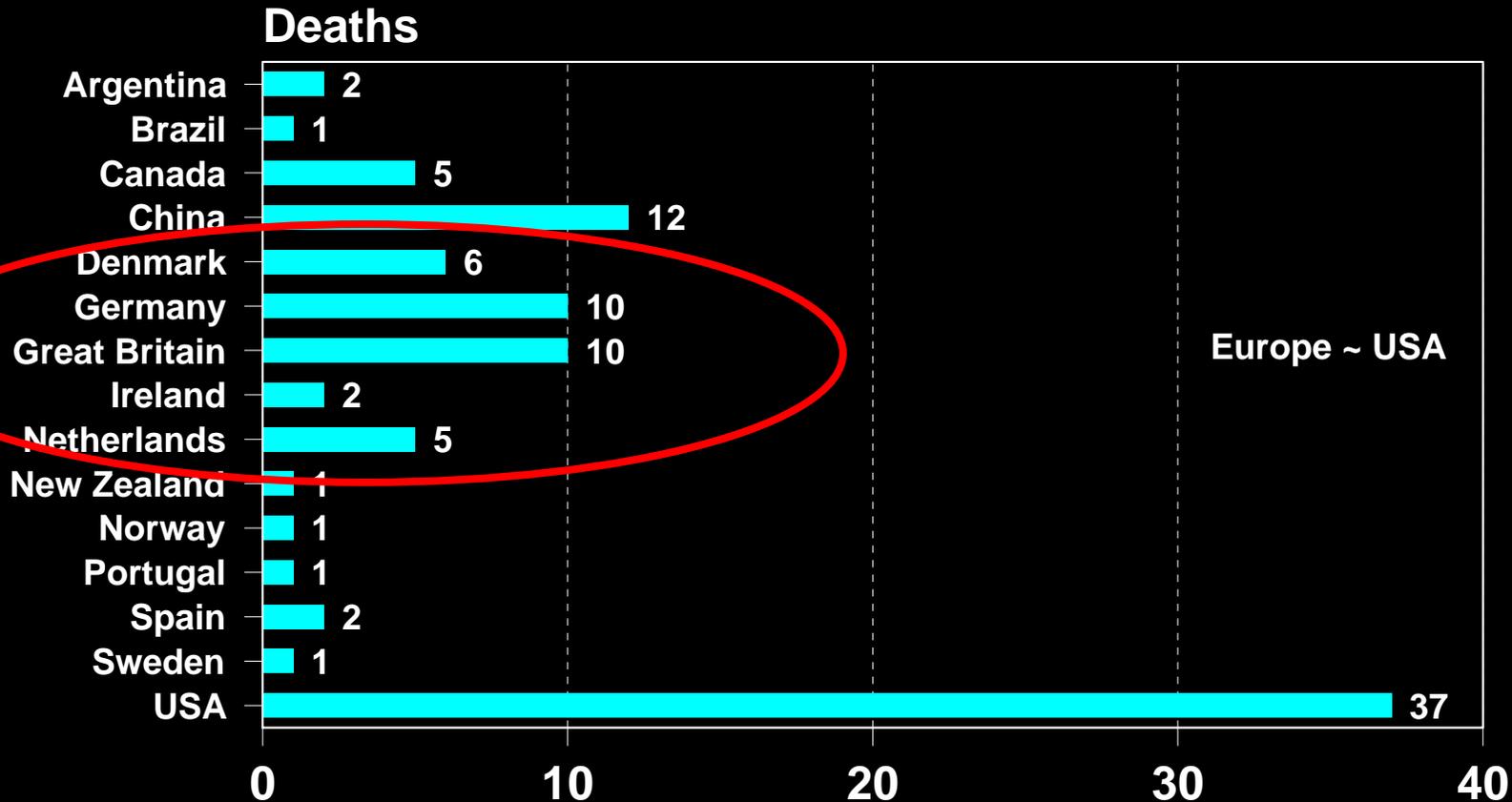
Deaths by Size



Deaths by Activity 1980-2021



Deaths by Country 1980-2021



Age of Those Killed 1980-2021

	Age
Youngest Person Killed*	3
Oldest Person Killed**	85
Median Age	35

* Gin pole on hinged tower fell on child playing unsupervised.

** Heart attack after climbing to top of tower.

Other Observations of Those Killed 1980-2021

	Age
Male	94
Female	2
Child	1
Pilot	1
SkyDiver	1
Suicide	1
Prank	1

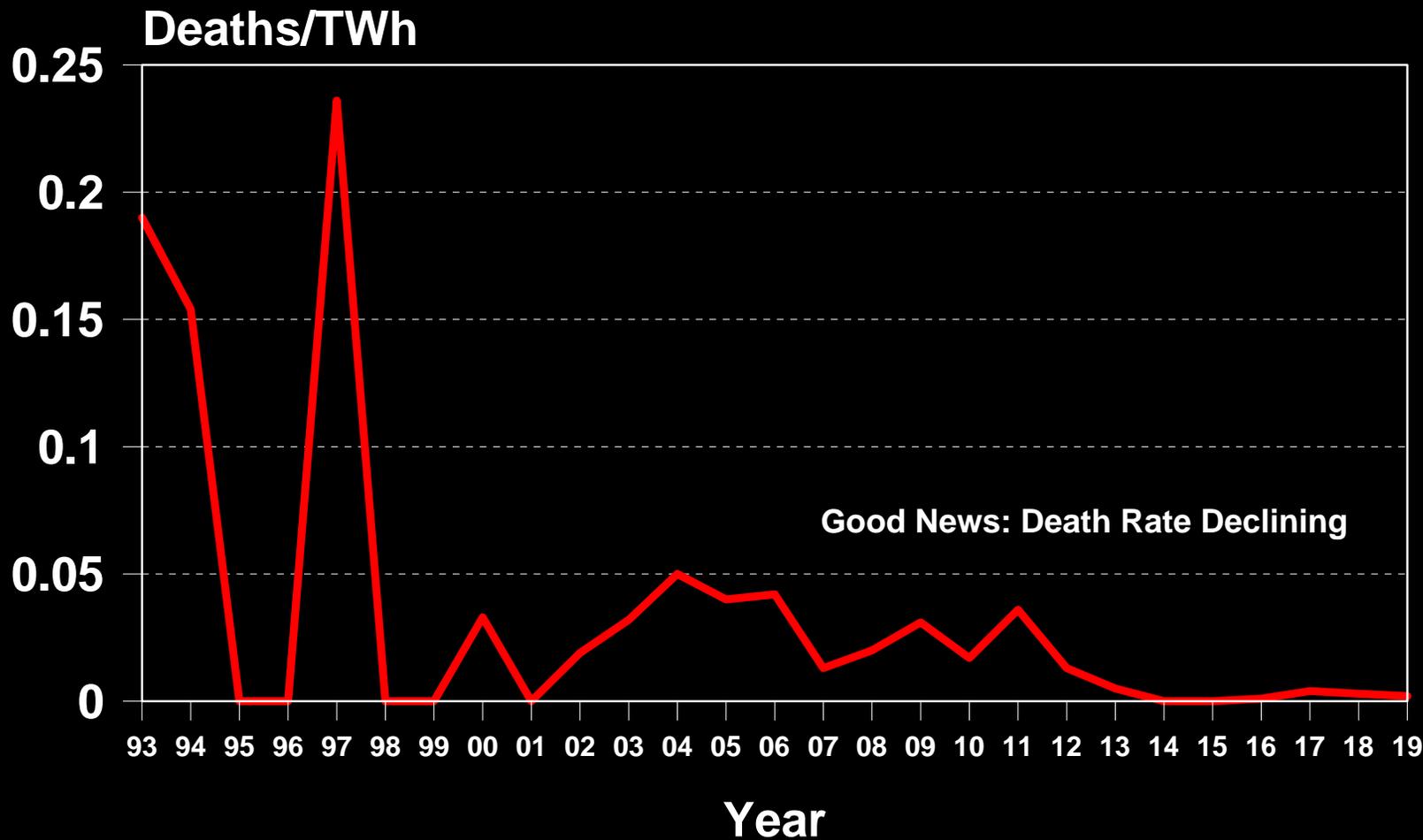
Most Killed in One Accident

	Year	Deaths
Denmark	1990	2
China	2011	3
China	2011	5

Deadliest Years

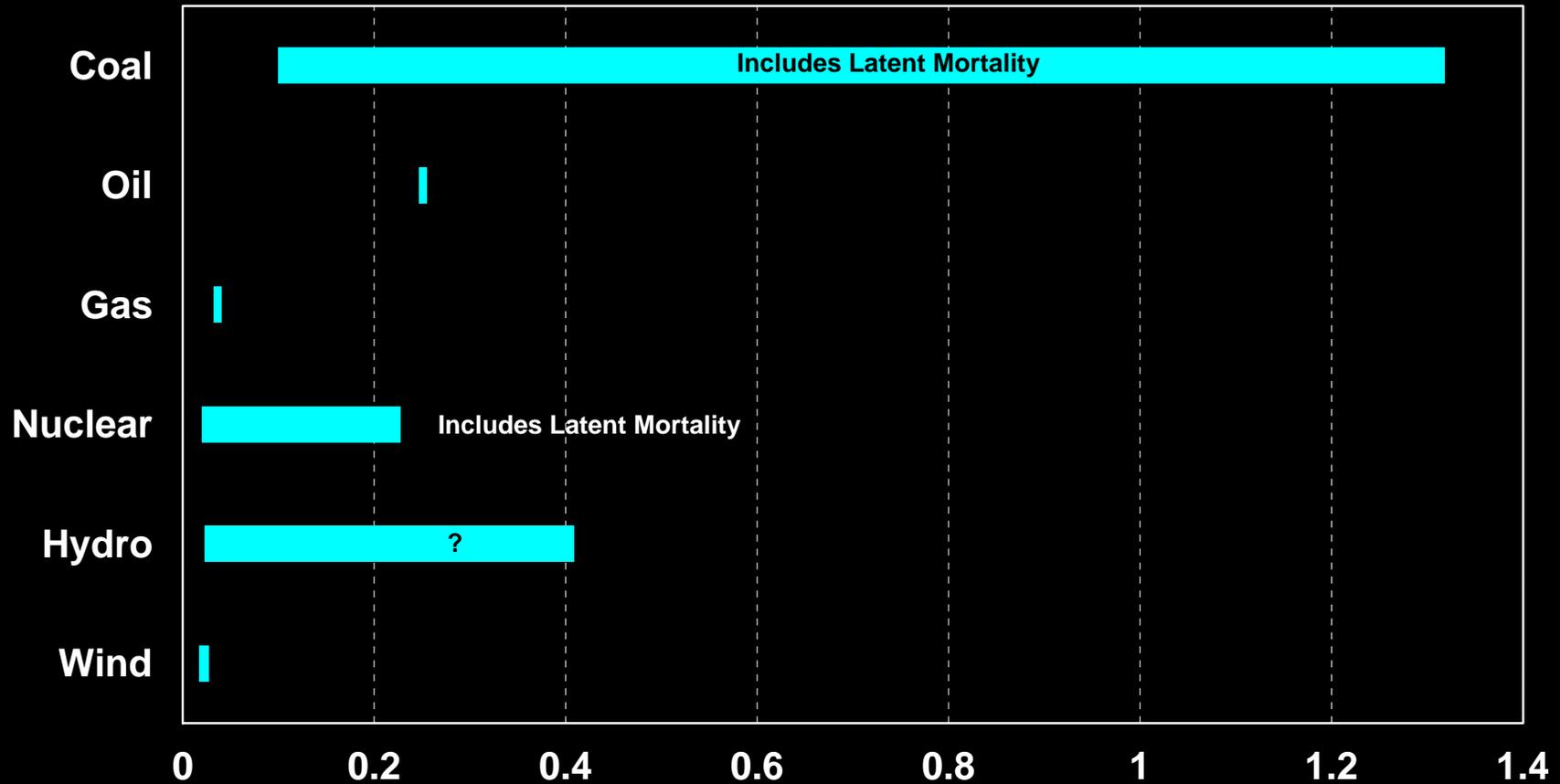
Year	Deaths
2011	16
2009	8
2012	7
2010	6

Occupational Deaths in Wind Energy 1993-2019



Occupation Deaths in Power Generation

Deaths/TWh



Small Wind Turbine Tower Safety

- Aerial Lifts
- Fall Arrest Systems
- Work Platforms
- Anchors
- Rotor Locking Pins
- Yaw Pins
- Tower Training

Paul Gipe, wind-works.org

NREL, Colorado



Tower Safety



Hard Hat (Helmet)

Gloves

Fall-Arrest Sleeve

Fall-Arrest Cable

Small Wind Work Platforms



Aerowatt, 1998 Patagonia

Paul Gipe, wind-works.org



E3120, 2012 Scotland

Small Wind Work Platforms

Hand Rail, No Toe Guard



Paul Gipe, wind-works.org

V17, 2012 Denmark

Small Wind

- **Locked Access Ladders**
- **Ladder with Side Rails**
- **No Open Pegs**

Paul Gipe, wind-works.org



© Rope Partner



Large Turbine Tower Safety

- **Helmet**
- **Gloves**
- **Harness**
- **Radio**
- **Fall Arrest**

Paul Gipe, wind-works.org

Cleveland, Ohio

Safety . . .

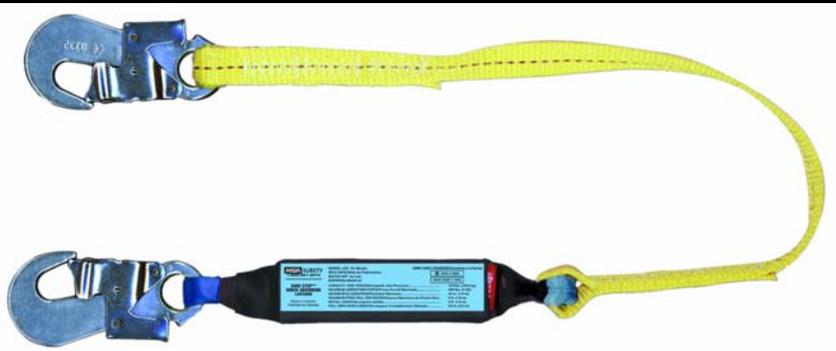
- Anti-Climb Guards
- Shaft Guards
- Two-Person Crews
- Regular Reviews
- Myth Busting
 - “Never Fall Ascending”
 - “Want to Jump Free”

Paul Gipe, wind-works.org



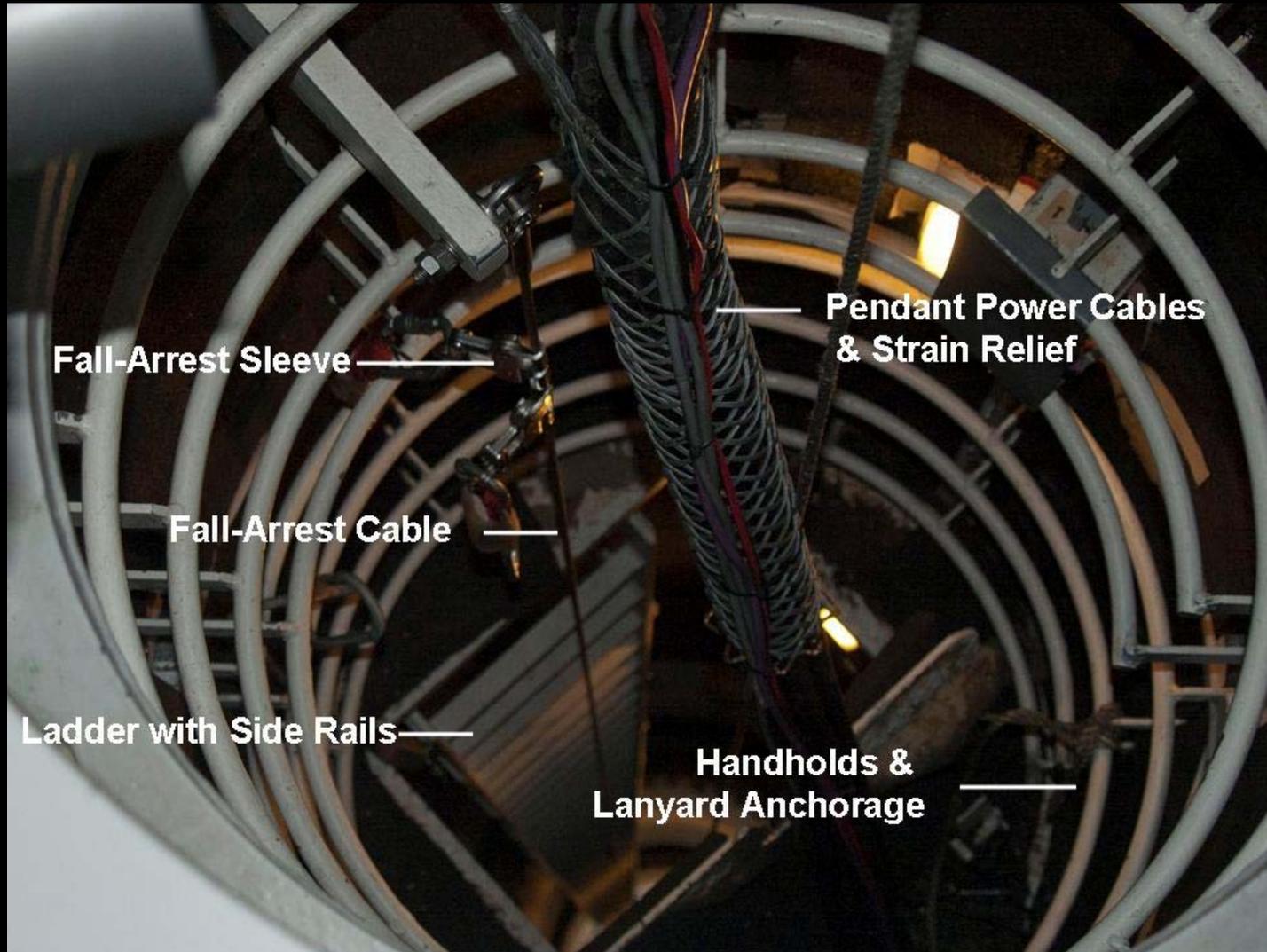
Fall Protection

- **Body Harness**
- **Shock-Absorbing Lanyard**
- **Double-Acting Snap Hook**
- **Positioning Belt is Only for Positioning**



Paul Gipe, wind-works.org

Tower Safety



Fall-Arrest Sleeve

Fall-Arrest Cable

Ladder with Side Rails

Pendant Power Cables
& Strain Relief

Handholds &
Lanyard Anchorage

Ladders Must Have Side Rails

Gut Rippers

NOT This

Paul Gipe, wind-works.org

This

Secure Rotor Locking



Blade Root Doors



Blade Root Door

Aerial Lifts—No Baskets



Paul Gipe, wind-works.org

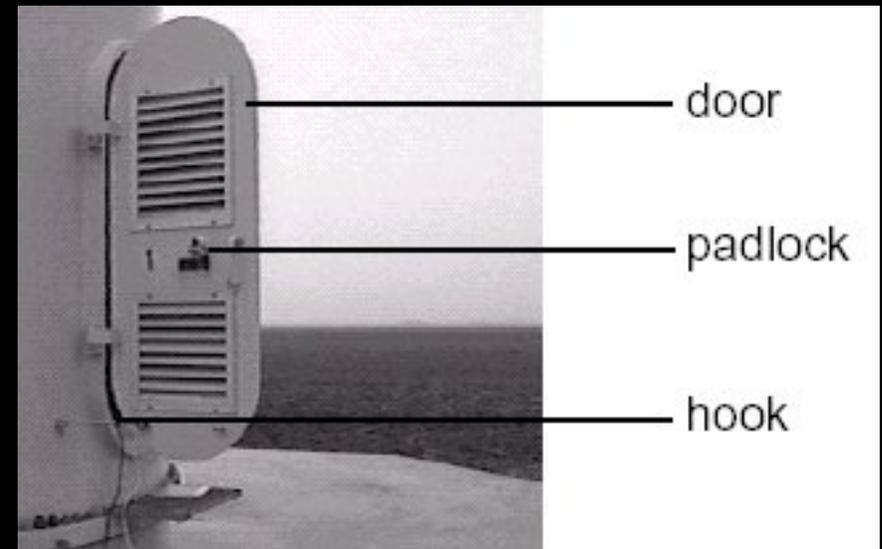
Safe Access



Secure Access

It's Windy Out There

- **Lock to Prevent
Unauthorized Access**
- **Latch to Prevent
Door Closing**
- **Interior Release
To Prevent Confinement**
- **Ventilation Louvers**



© Lagerwey

Clearly Marked Anchorages



Secure Rails & Attachments



© Nordex



Paul Gipe, wind-works.org

Be Careful Out There—Don't be Stupid

Absolutely Do Not Do This at Home!

Paul Gipe, wind-works.org

Wulf Test Field, Tehachapi, California



“Nothing is as powerful as an idea whose time has come.”

-- Victor Hugo*

Paul Gipe, wind-works.org

***"Il n'est rien au monde d'aussi puissant qu'une idée dont l'heure est venue." Victor Hugo**

Tera Kora, Curaçao

Our Time has Come

Paul Gipe, wind-works.org



Gaspé Peninsula, Quebec

No Time for Half-Measures

No Time to Lose

Paul Gipe, wind-works.org



Time to Take the Road to the Future



Freiburg, Germany

Paul Gipe, wind-works.org

We Need A Lot More Wind . . .

Matane, Quebec

Paul Gipe, wind-works.org



Hinesburg, Vermont

... A Lot More Solar



Paul Gipe, wind-works.org

A photograph of a baby sitting in a dark blue patterned stroller. The baby is wearing a blue and white striped beanie and a dark blue jacket. The baby is holding a small wooden sailboat toy with a blue and white sail. The background is a bright yellow wall with a blue section. The text is overlaid on the top left of the image.

... A Lot More Renewable Energy a Technology for Life*

***from N.F.S. Grundtvig, Danish Theologian**

Paul Gipe, wind-works.org

The Revolution Has Begun



Adam Twine, Westmill Wind Cooperative, Oxfordshire, England

Paul Gipe, wind-works.org

Paul Gipe, wind-works.org