Mission 2018

September 22, 2014

MIT Libraries

Hal Gustin Day: 09/29/2014

Hal Gustin
hlgustin@structint.com 720-320-6722 website: www.structint.com

Occupation: Engineer

MIT year: 1973

This will be my eighth year as an alumni mentor to the 12.000 class. The first seven have been energetic, stimulating, and a lot of fun.

I love the premise of the class.

1. Identify a problem that is huge, difficult (almost intractable), with major implications for the world.
2. Assign it to a group of people with immense ability but no or very little exposure to the conventional ways of looking at the problem.
3. See what they come up with.

Each year, I've tried to help out however I can, not being myself an expert on whatever the topic is. In the process, I've learned a lot, had an exciting ride, and made some friends. I've also answered a lot of e-mails at 3 am. I look forward to more of the same this year.

MITLibraries

New Readings are Posted

Class readings for week 4

- Here's a PDF of the IMF report on *How Much Carbon Pricing is in Countries' Own Interests? The Critical Role of Co-Benefits*. There's a summary here.
- The world's population is soaring and might reach 12 billion by 2010. Check out this short article.
- Greenland's snow is exceptionally dark. Read why it should worry you.
- Mohamed Al Hammadi, explains why the UAE has chosen to develop nuclear energy in an interesting interview.
- More press about the low relative cost of climate solutions, but as usual the Push for New Pact on Climate Change Is Plagued by Old Divide of Wealth.
- Then there's China.
- Learn more about hydro power.
- CEO of Allegheny Conference wants to shore up our energy grid, but as usual it's all about the money because when the grid is overworked, traders profit.
- Engineers in the US have invented a battery, made of three molten metals, which could help smooth the power supply from renewable energy sources.

News of Interest

MITLibraries

Geographic Information Systems (GIS) for 12.000

Daniel Sheehan

Senior GIS Specialist

MIT Libraries

MITLibraries

Contact us

http://libguides.mit.edu/gis

gishelp@mit.edu

MITLibraries

What is a Geographic Information System (GIS)?

- Tool for managing, processing, and visualizing geographic information

What is geographic information?

- Data about a specific place or places

MIT Libraries

Outline

- Brief description of GIS
- Case study – Locating transmission lines
  - Data sources
  - Data quality
  - Least Cost Path tool

MIT Libraries

For example

- Political boundaries
- Precipitation amounts
- Location of rivers and dams
- Wind power potential
- Elevation
- Population

MIT Libraries

Manage, process, visualize geographic data

- Storing elevation, population, and wind power potential data
- Find best routes from wind generated power to power consumers
- Where can wind power be generated and still be close to population centers?

MIT Libraries

How you might use GIS – cost path analysis

- And some data that may be useful

MIT Libraries

Visualizing Wind Data – determining best locations for wind farms

First, we need data

- National Renewable Energy Laboratory wind power potential datasets for the United States

http://www.nrel.gov/gis/data_wind.html

"The data provide an estimate of annual average wind resource for specific states or regions."

- Case study: Colorado

MIT Libraries

How good is the data?

- Read the (FGDC) metadata

http://www.nrel.gov/gis/data/GIS_Data_Technology_Specific/United_States/Wind/metadata/co_50m_metadata.htm

Abstract: Annual average wind resource potential for the state of Colorado, United States at a 50 meter height.

Purpose: Provide information on the wind resource potential for the state of Colorado.

However, the data is not suitable for micro-siting potential development projects.

MIT Libraries

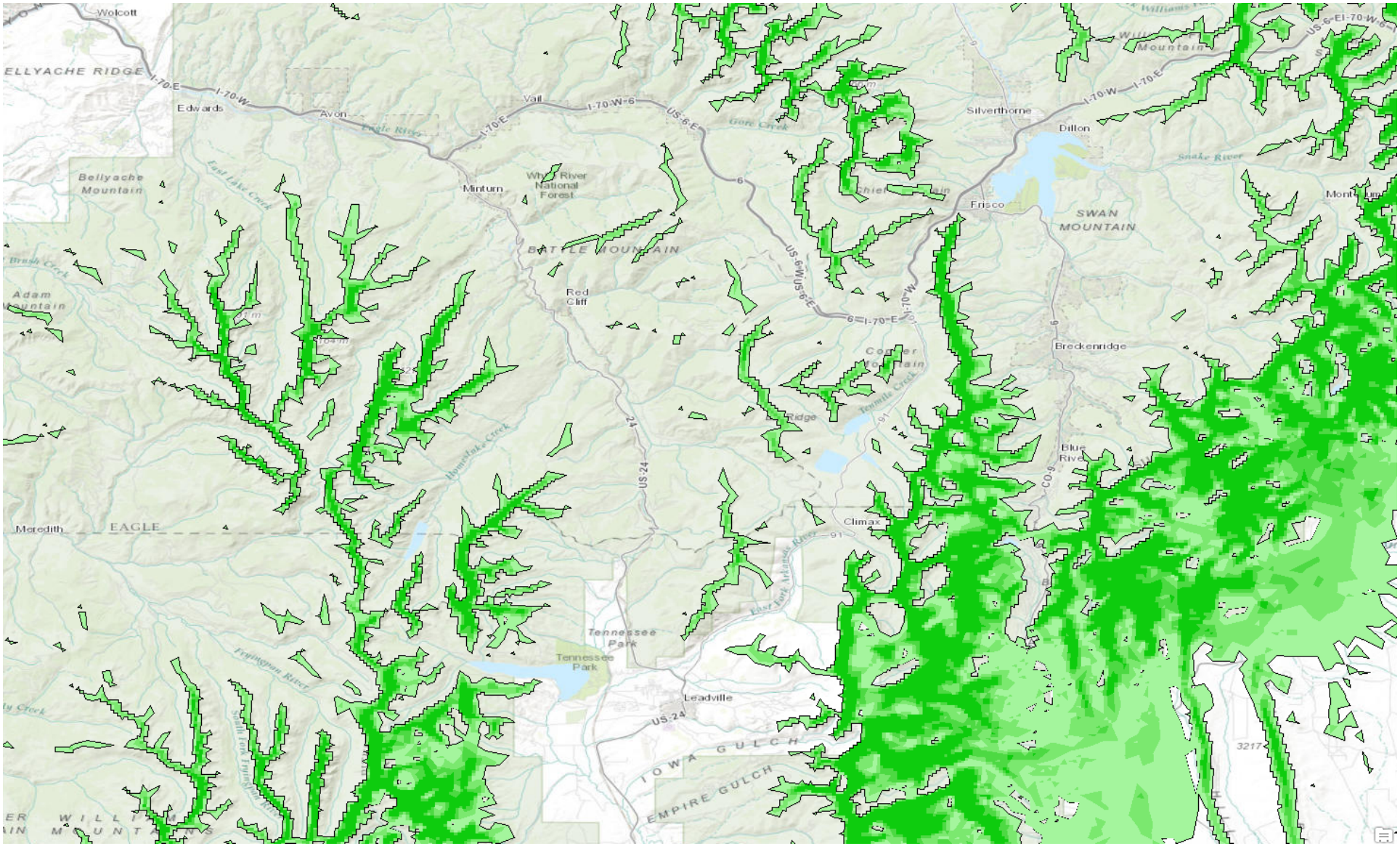
What are the values?

WPC -Wind power class is an indicator of likely resource strength, with a higher wind power class representing higher wind resource levels at 50 meter height

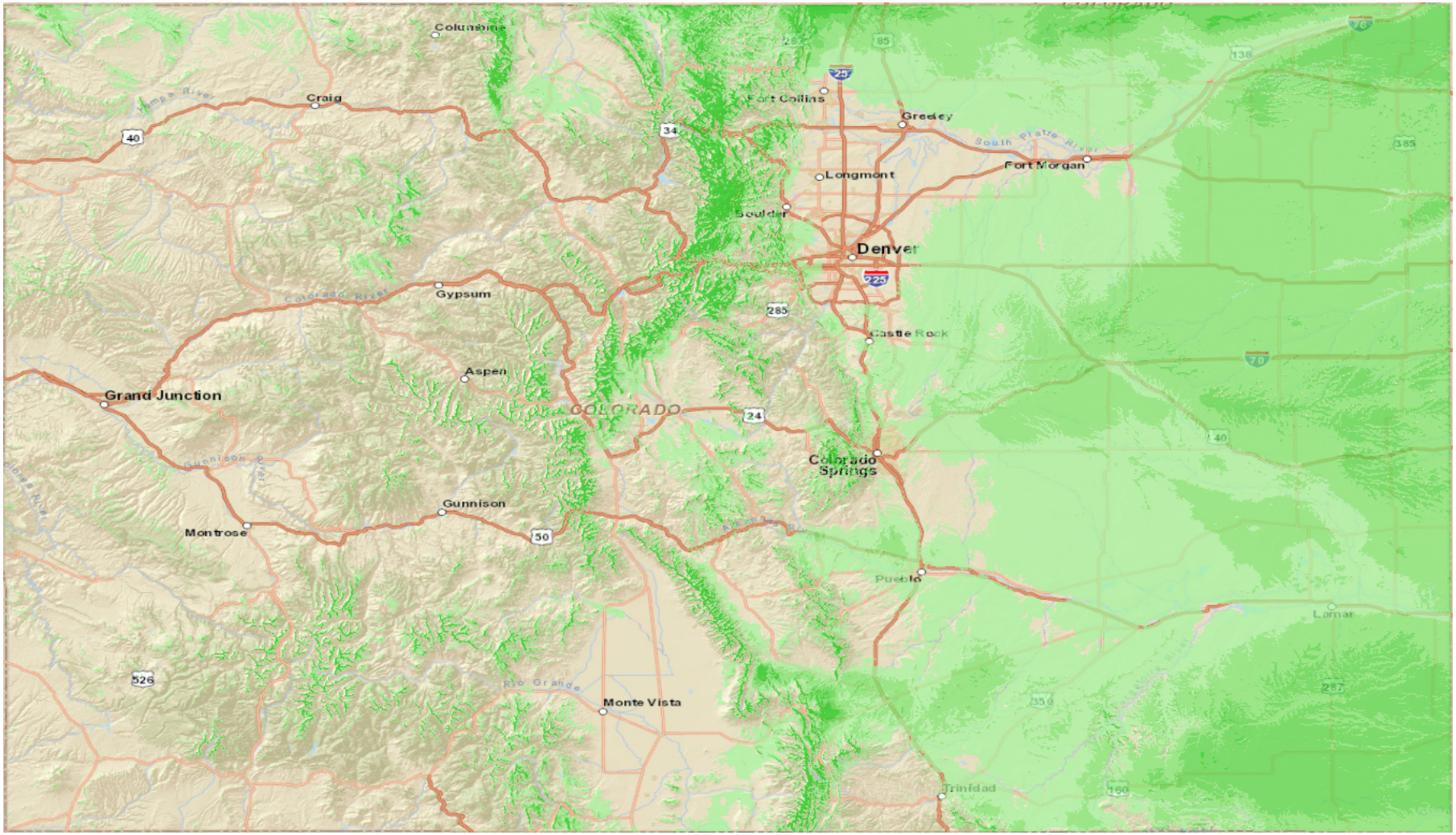
Wind Power Class Potential Density (W/m2) 1 Poor 0 - 200 2 Marginal 200 - 300 3 Fair 300 - 400 4 Good 400 - 500 5 Excellent 500 - 600 6 Outstanding 600 - 800 7 Superb > 800

MITLibraries

Highest potential is on mountain ridges.



And moderate potential across the plains east of the Front Range



Add other data to see if wind power on the ridges of the Rockies is feasible

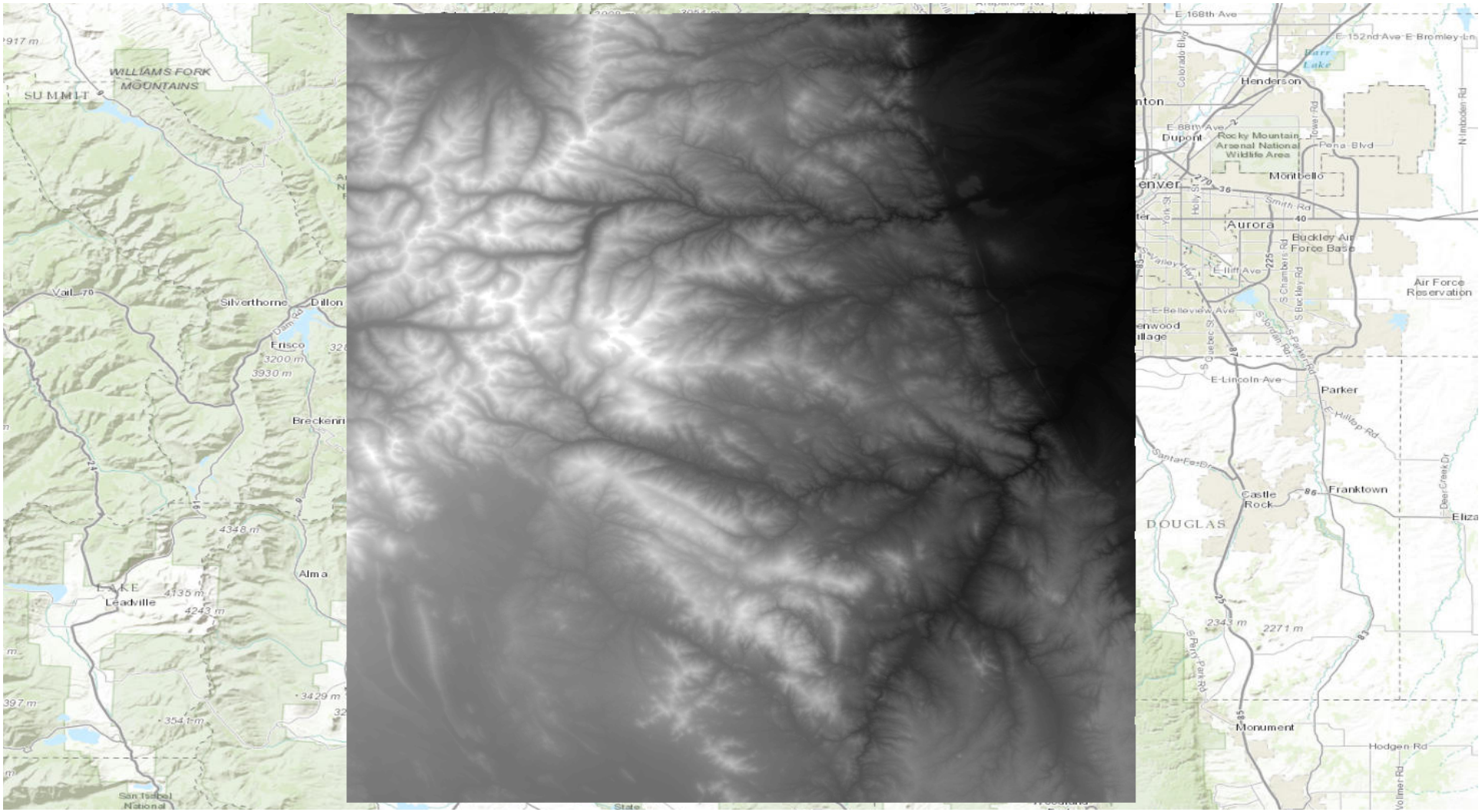
- Add elevation data
  - Derive slope information
- Add population information
  - Where do you need the electricity
- Add current land use information
  - Determine what land is available for utility lines

MIT Libraries

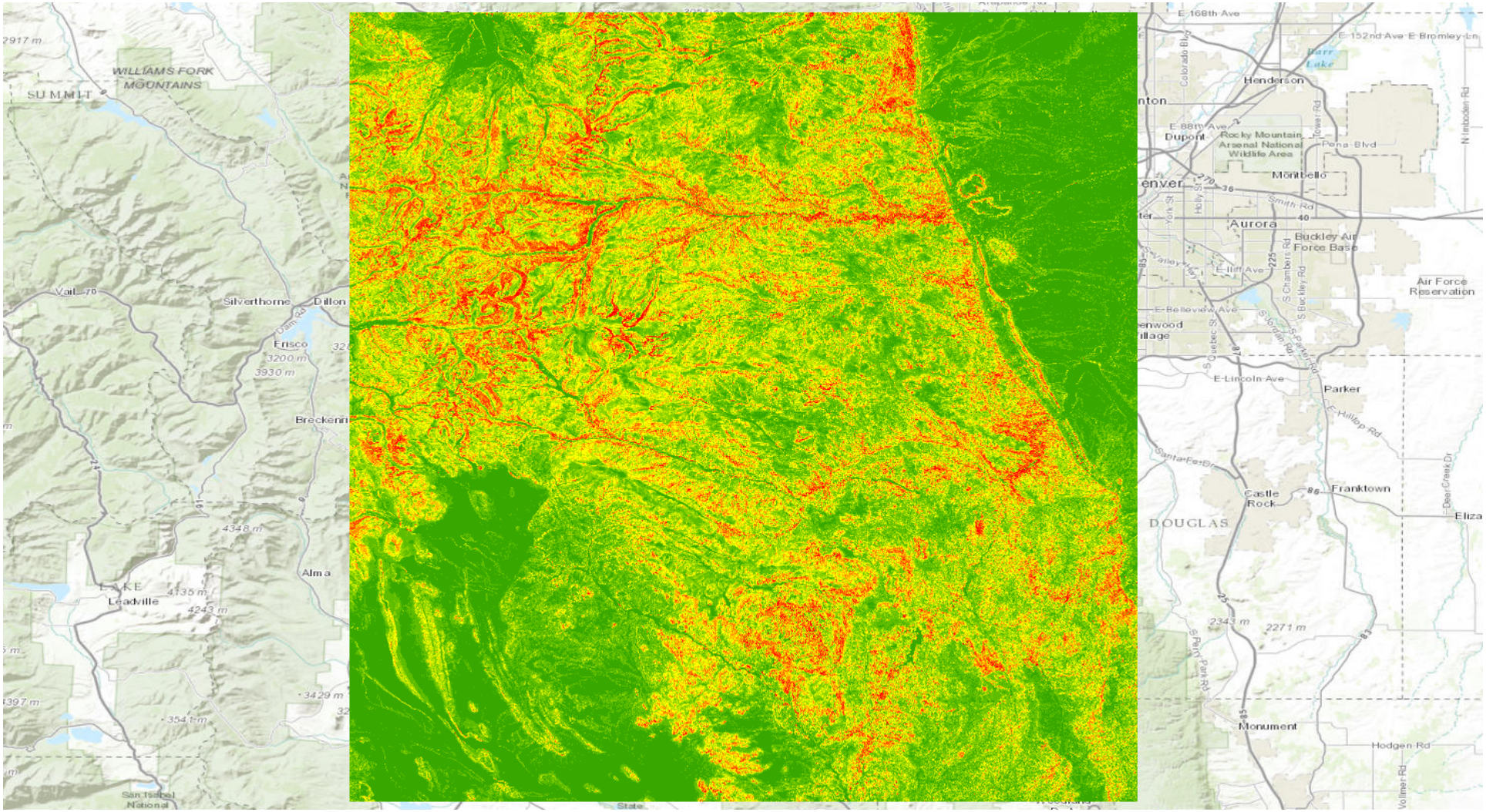
Digital Elevation Model (DEM)

10 meter resolution

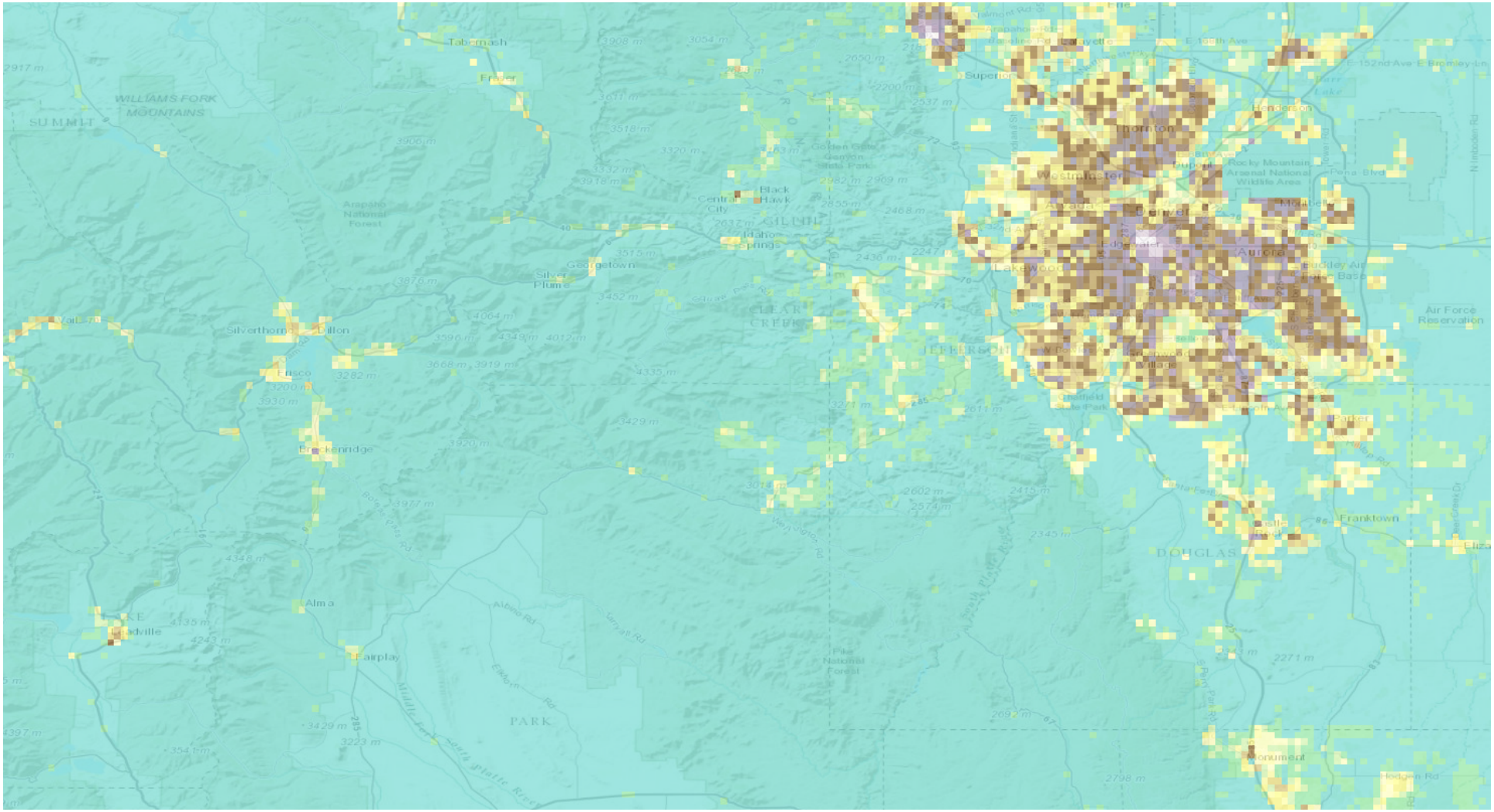
Higher elevations are lighter



Slopes – yellow is 20%, red is 35%



Population – browns are > 1,000/KM^2

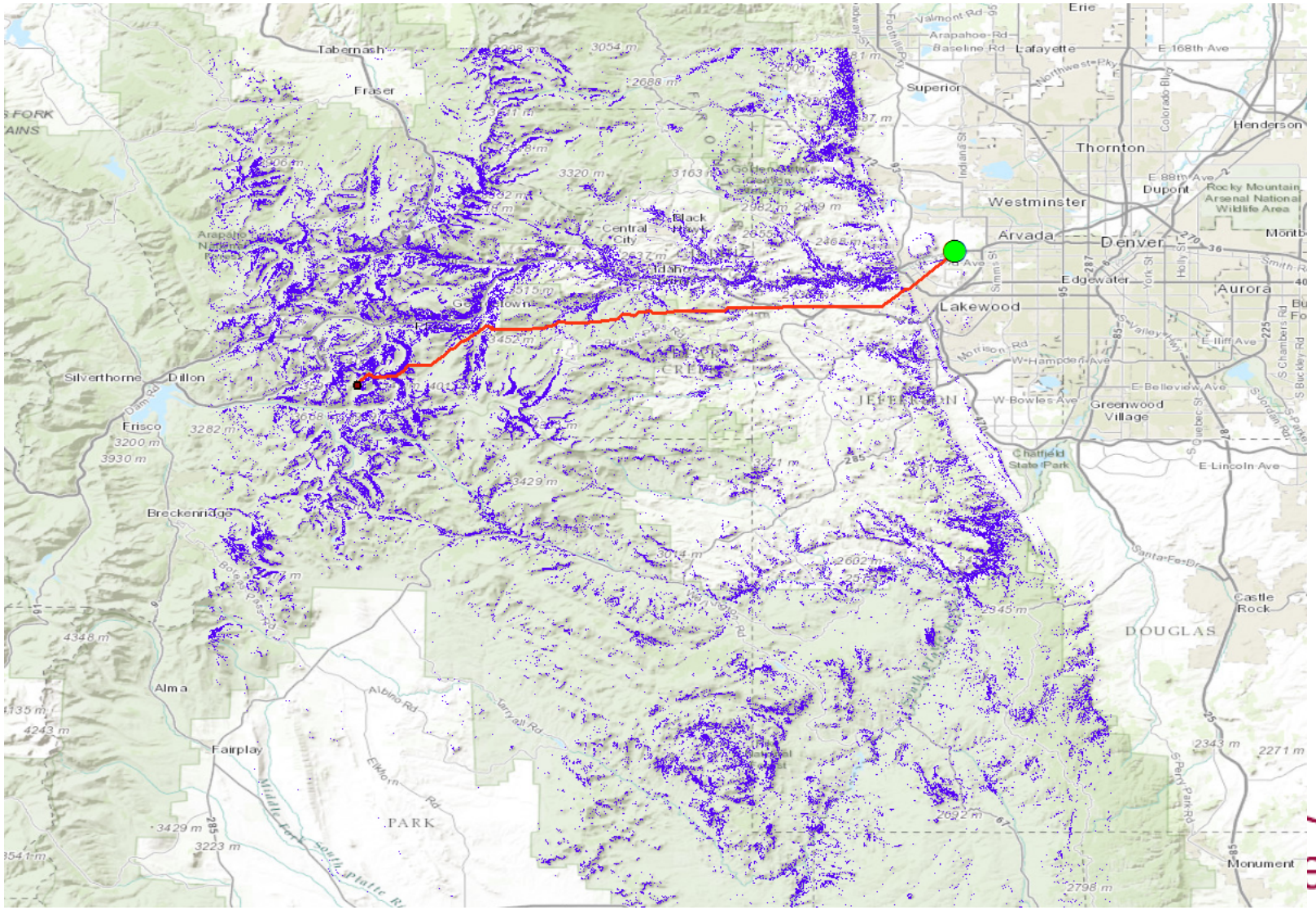


Least cost path

- Accounts for costs associated with building across
  - Heavily populated areas
  - Steep slopes
  - Land uses not compatible with transmission wires

MIT Libraries

Least cost path



Some data sources

- NREL
  - Wind data - http://www.nrel.gov/gis/data_wind.html
- USGS
  - US elev - http://viewer.nationalmap.gov/viewer/
  - Global elev - http://reverb.echo.nasa.gov/reverb/
  - Landcover http://landcover.usgs.gov/landcoverdata.php
- Eastview
  - Landscan (population data) http://wms.cartographic.com/landscan/portal.aspx (from MIT only)

MIT Libraries

Welcome to the MIT Libraries

Chris Sherratt
EAPS, Energy, Nuclear Science & Engineering, Environment
Librarian

MIT Libraries

Terrascope & the MIT Libraries

Mission 2018: Our Energy Future

Chris Sherratt, Anne Graham, Michael Noga, Daniel Sheehan
your librarians

MITLibraries

Our purpose today

To introduce you to the Libraries' resources

because this will

MIT Libraries

save you time when you need useful, reliable information

MIT Libraries

More reasons

You'll *need* good, reliable information

MIT Libraries

More reasons

You'll *need* good, reliable information

It's important to decide *where* to search

MIT Libraries

More reasons

You'll *need* good, reliable information

It's important to decide *where* to search

Librarians are very friendly and want to get to know you!

MIT Libraries

So how do we make these introductions?

MIT Libraries

We will…

Show you the 12.000 library page

MIT Libraries

Show you the 12.000 library page

Give suggestions about where to start

MIT Libraries

Show you the 12.000 library page

Give suggestions about where to start

Show some examples, and

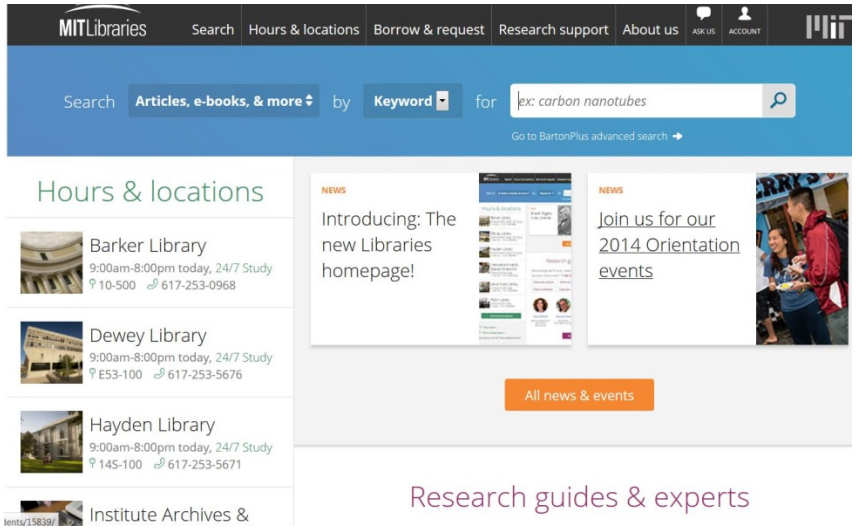
Meet with your team sometime later on

MIT Libraries

So let's get started

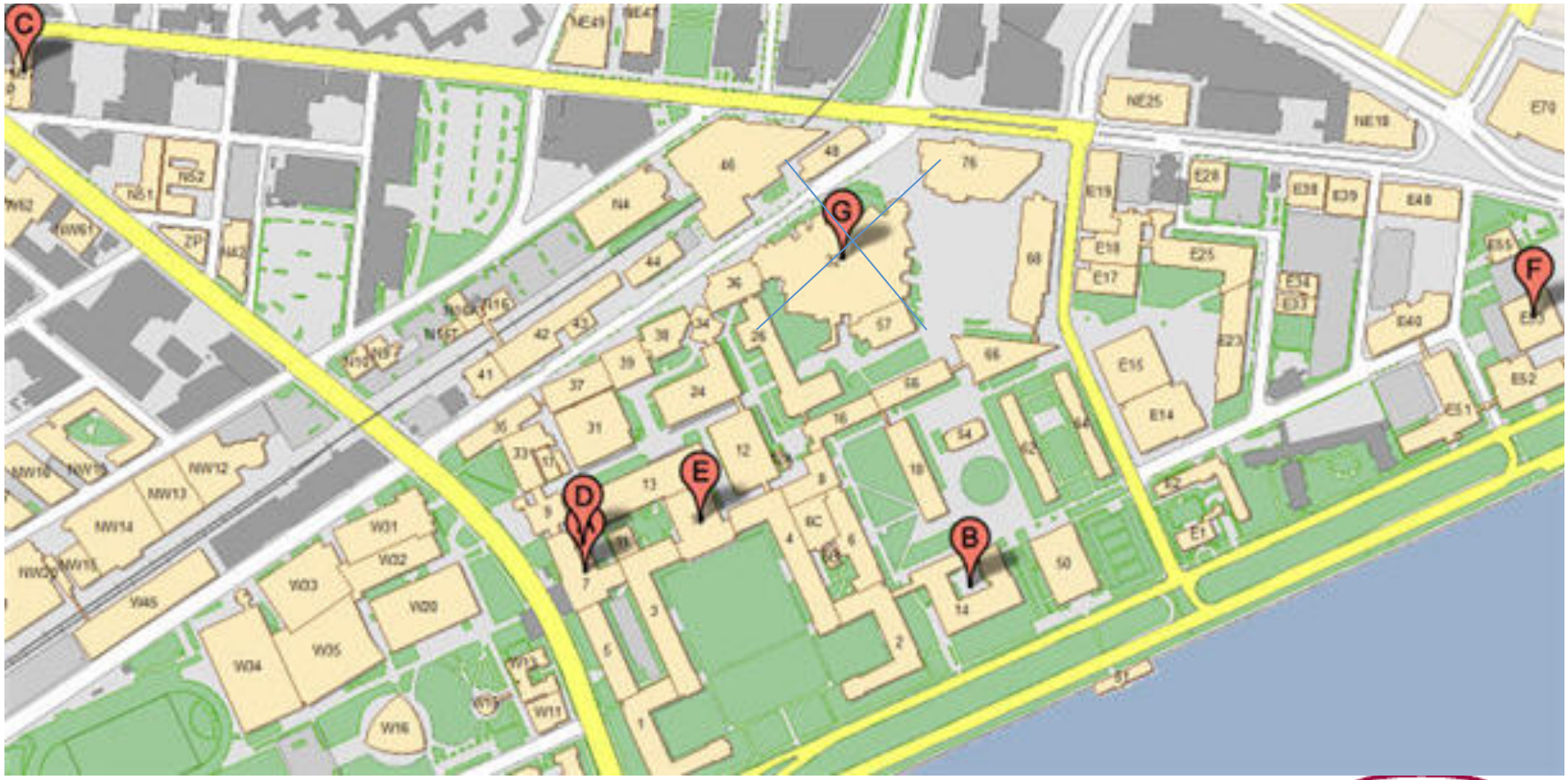
MIT Libraries

Libraries are physical and virtual



MITLibraries

Physical: 5 libraries in 4 buildings



D= Rotch =7 E=Barker=10 , B=Hayden=14S F=Dewey=E53

MITLibraries

Virtual, for 12.000

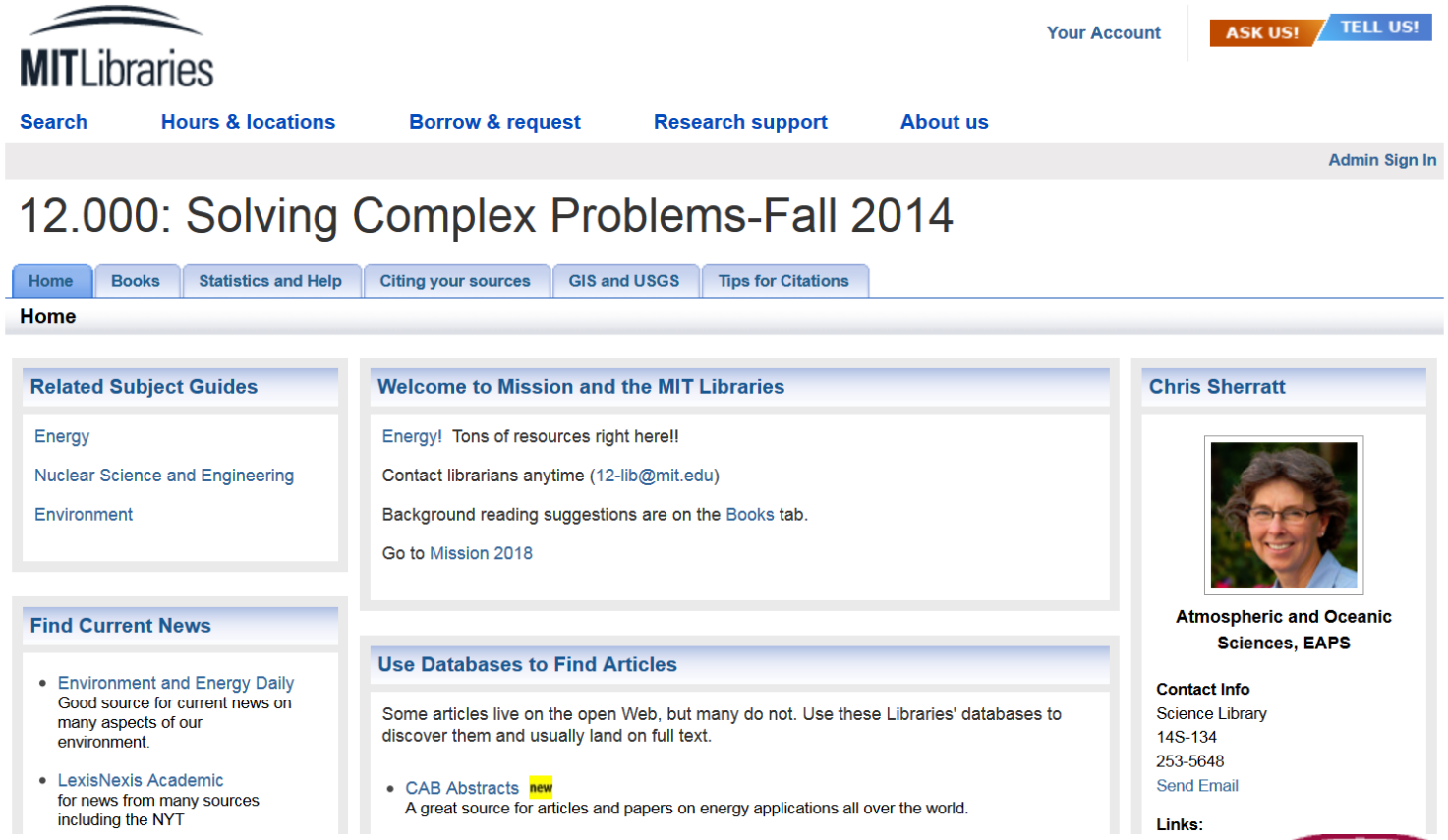
The Mission 2018 Community

- **Student Teams:** Here's a list of the various topics and/or questions that, when combined and integrated, will provide a complete analysis.
- **2018 Faculty & staff:** Instructors, TA's & UTF's for Mission 2018: Fall Semester 2014
- **Review Panelists:** Experts with extensive knowledge about the special problems associated with energy.
- **Library Liasons:** Representatives from MIT libraries who assist teams with their research strategies. The 12.000 class library page for 2014 is **here**.
- **A list**, by team, of the **students** enrolled in Mission 2018.
- Here's a **list** of Alumni Mentors with their related teams.

MIT Libraries

The 12.000 Libraries page

http://libguides.mit.edu/mission2018



MITLibraries

Some book suggestions (more in Barton)

Home | Books | Statistics and Help | Citing your sources | GIS and USGS | Tips for Citations

Books

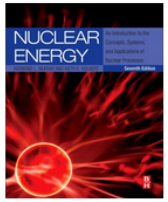
Online Encyclopedias

Good for background info.

- We suggest
  5 titles to choose from here

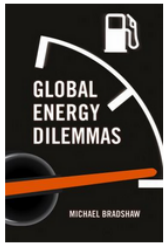
Ideas...

Some teams might begin with

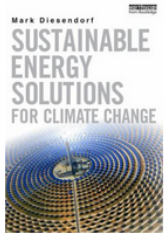


Nuclear Energy - Keith E. Holber
Publication Date: 2014

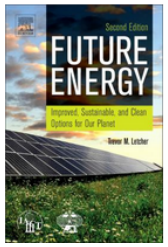
Librarians' suggestions



Global Energy Dilemmas - Mike Bradshaw
Publication Date: 2013
Today's global energy system faces two major challenges: how to secure the supply of reliable and affordable energy; and how to rapidly transform to a low-carbon, efficient and environmentally harmless energy supply.

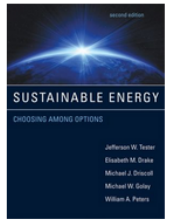


Sustainable Energy Solutions for Climate Change - Mark Diesendorf
Publication Date: 2014
Coming soon! This book brings together the science, technology, economics and policy issues.



Future Energy - Trevor Letcher (Editor)
Publication Date: 2013

Also...



Sustainable Energy - Jefferson W. Tester et.al.
Publication Date: 2012
A widely used textbook designed for students. MIT authors!

MITLibraries

And links to thousands of articles

Use Databases to Find Articles

edi

Some articles live on the open Web, but many do not. Use these Libraries' databases to discover them and usually land on full text.

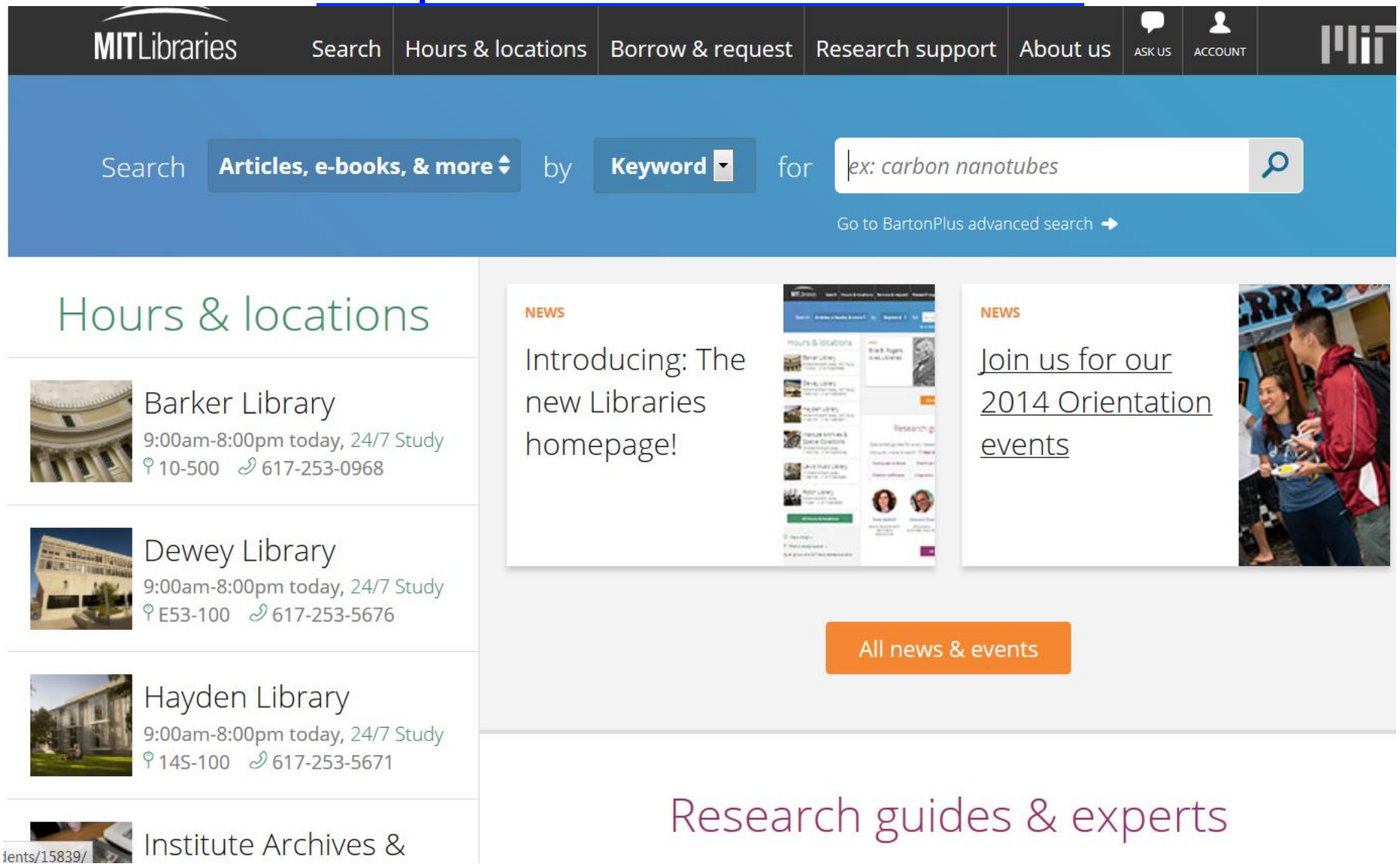
(Add / Edit Text)

- CAB Abstracts new
  A great source for articles and papers on energy applications all over the world.
- Web of Science (ISI Web of Knowledge)
  Good for articles from many disciplines. Limit to SCI for science; SSCI for policy and economics.
- Environment Index
  Useful for finding environmental policy articles
- Compendex
  covers all fields of engineering, including nuclear.
- Political Science Complete
  Good source for articles, reference books and conference papers in political science.

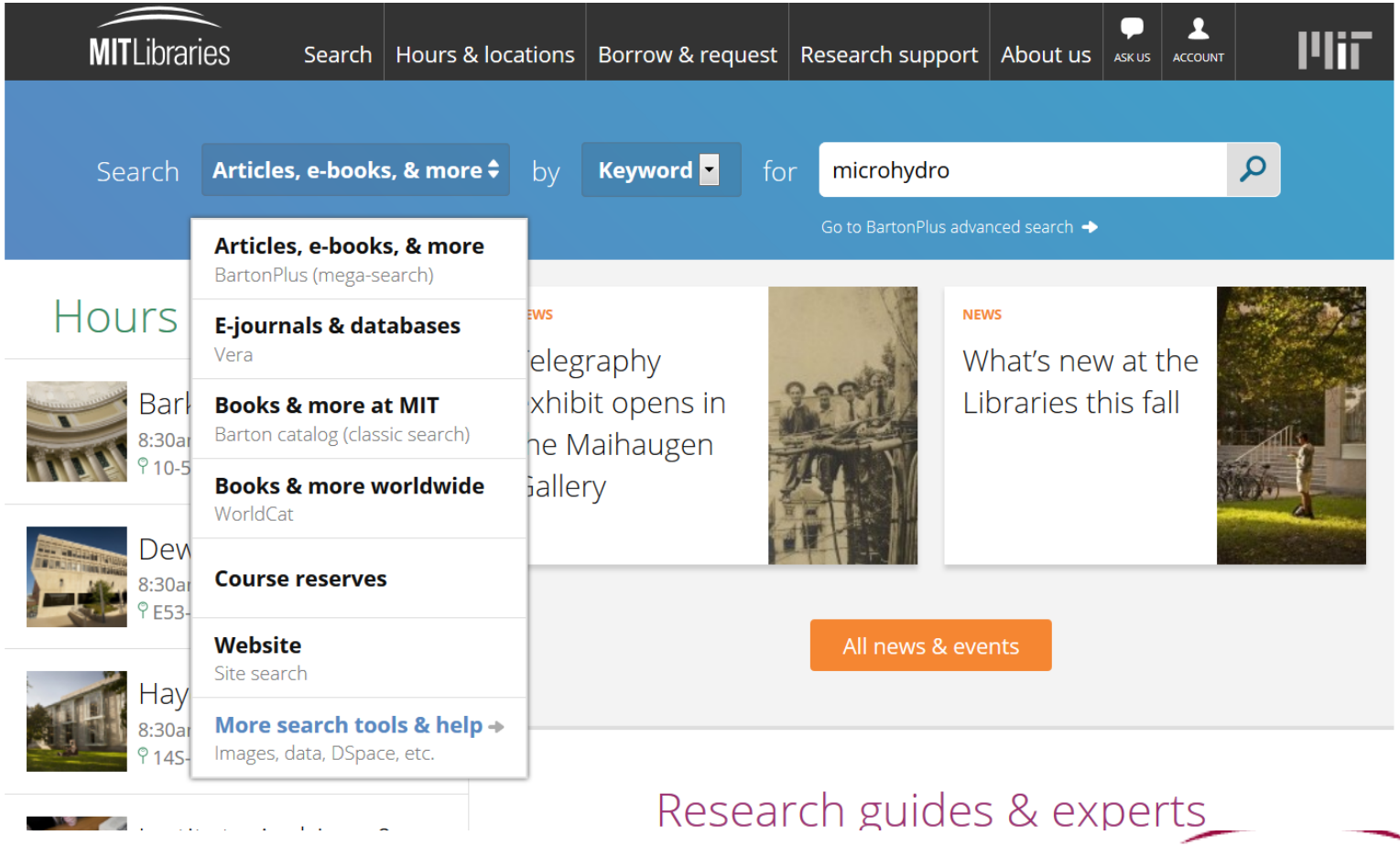
AND we have…the World Bank e-library!

MITLibraries

http://libraries.mit.edu



Think about where to start



MITLibraries

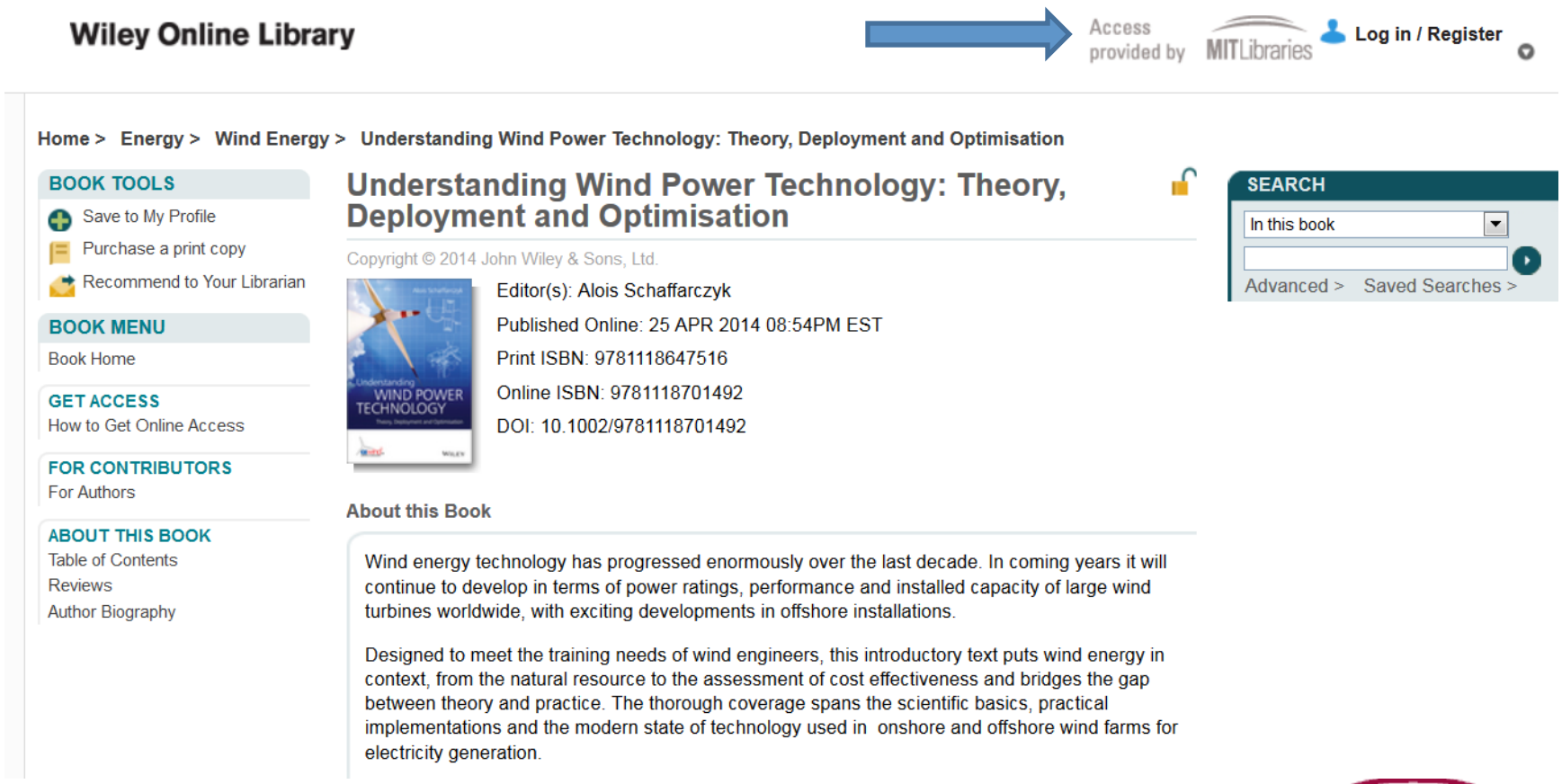
Barton leads to MIT owned books

Author	Davis, Scott.
Title	**Microhydro** [electronic resource] : clean power from water / Scott Davis.
Online Access	Get this MIT Click button for available online volumes
Published	Gabriola Island, B.C. : New Society Publishers, c2003.
Description	1 online resource (xvii, 157 p.) : ill.
Series	Wiser living series.
Format	Book
Note	"A Mother earth news book for wiser living"--Cover.
Bibliography	Includes bibliographical references (p. 144-145) and index.
Summary	Hydroelectricity is the world's largest -- and cleanest -- source of renewable -energy. But d vacuum about the smallest version of the technology dubbed "the simplest, most reliable a practical, **Microhydro** is the first complete book on the topic in a decade. Covering both A equipment options, and legal, environmental, and economic factors.
Subject	Hydroelectric power plants. Renewable energy sources.

NOTE Subject links!

MITLibraries

Here's a basic, online book on wind



MITLibraries

To find articles: use our subject databases

These are listed on the 12.000 page

They'll link to full-text when available

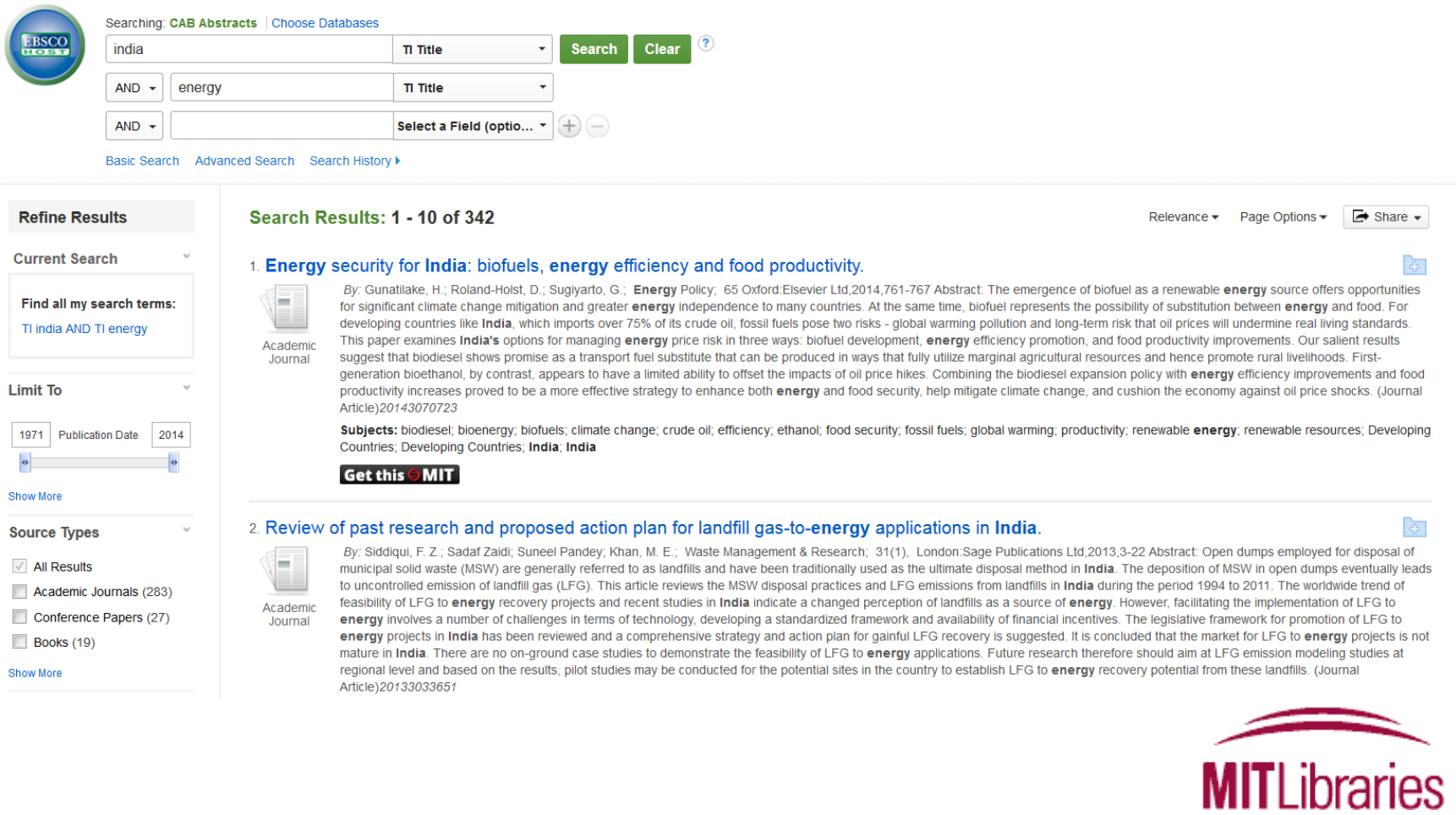
CAB

Web of Science

Compendex/Inspec

MIT Libraries

These lead to citations!



MIT Libraries

one example

Municipal solid waste - waste to **energy** conversion in **India**: an overview.

Author(s): Reddy, M. V.

Address: Department of Ecology and Environmental Sciences, Pondicherry University, Puducherry 605 014, **India**.; venkateshsrinivas1@gmail.com

Source: International Journal of Environmental Technology and Management 17 (2/3/4) Geneva: Inderscience Enterprises Ltd,2014, 283-292

Language: English

Country of Publication: Switzerland

Abstract: Municipal solid waste (MSW) is generated in enormous quantities, in **India**, causing environmental problems. It is collected primarily by sweeping in **India** and dumped on the outskirts of urban areas, which pollute the environment. Such MSWs also release methane and carbon dioxide, which are important greenhouse gases. MSW comprises biodegradable material. The MSW disposal methods in **India** mainly include land filling, separating waste and composting, biomethanation, incineration, an conversion to refuse derived fuel (RDF). MSW can be converted to non-conventional **energy** (WtE). Otherwise, the MSW disposal in **India** open dumping facilitates breeding of ensuing serious environmental health problems. The WtE conversion is going to become important in thickly populated cities. The biodegradable waste can be processed by aerobic composting including vermicomposting and by anaerobically, biomethanation. The non-biodegradable waste such as plastic can be processed for recovering **energy**. There are 16 such clean development mechanisms projects recovering **energy** from MSW i **India**, of which 11 are RDF-based and a few are biomethanation-based. However, landfill gas recovery projects were not successful in **India**. However, there are successful small projects in Tamil Nadu (**India**) deriving the CH4 gas from human-was biomethanation units generating electricity lighting street lights.

Number of References: 11 ref.

If you can't see full text don't give up!

Be sure MIT subscribes to the journal *and* the year you need: search Barton or Vera

IF we don't subscribe, ask for it on ILB

Email us with pesky problems

MIT Libraries

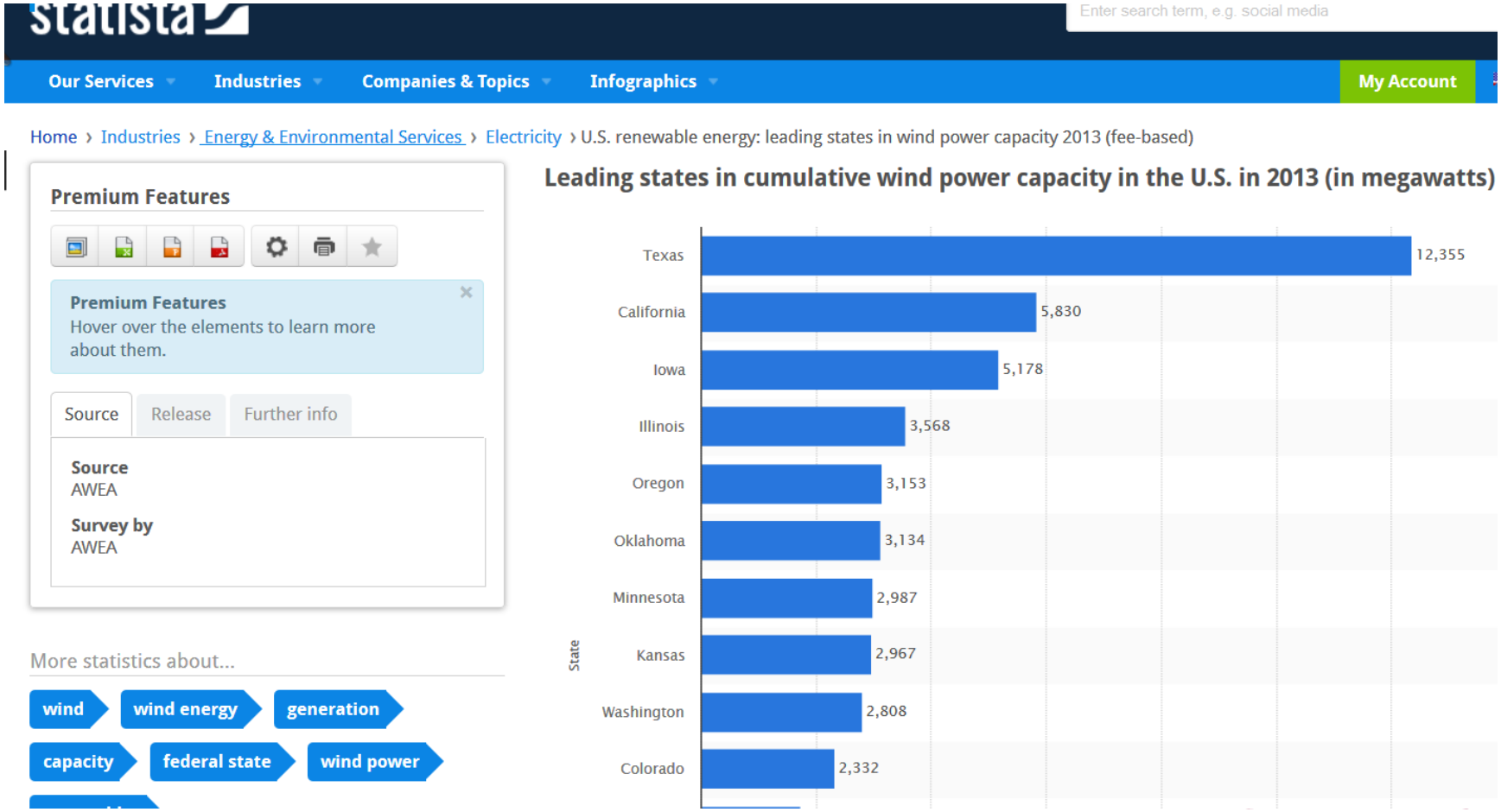
Lastly for today: Databases for statistics

Look for

- Statista
- GlobalData Power (formerly eTracks)
- IEA Databases

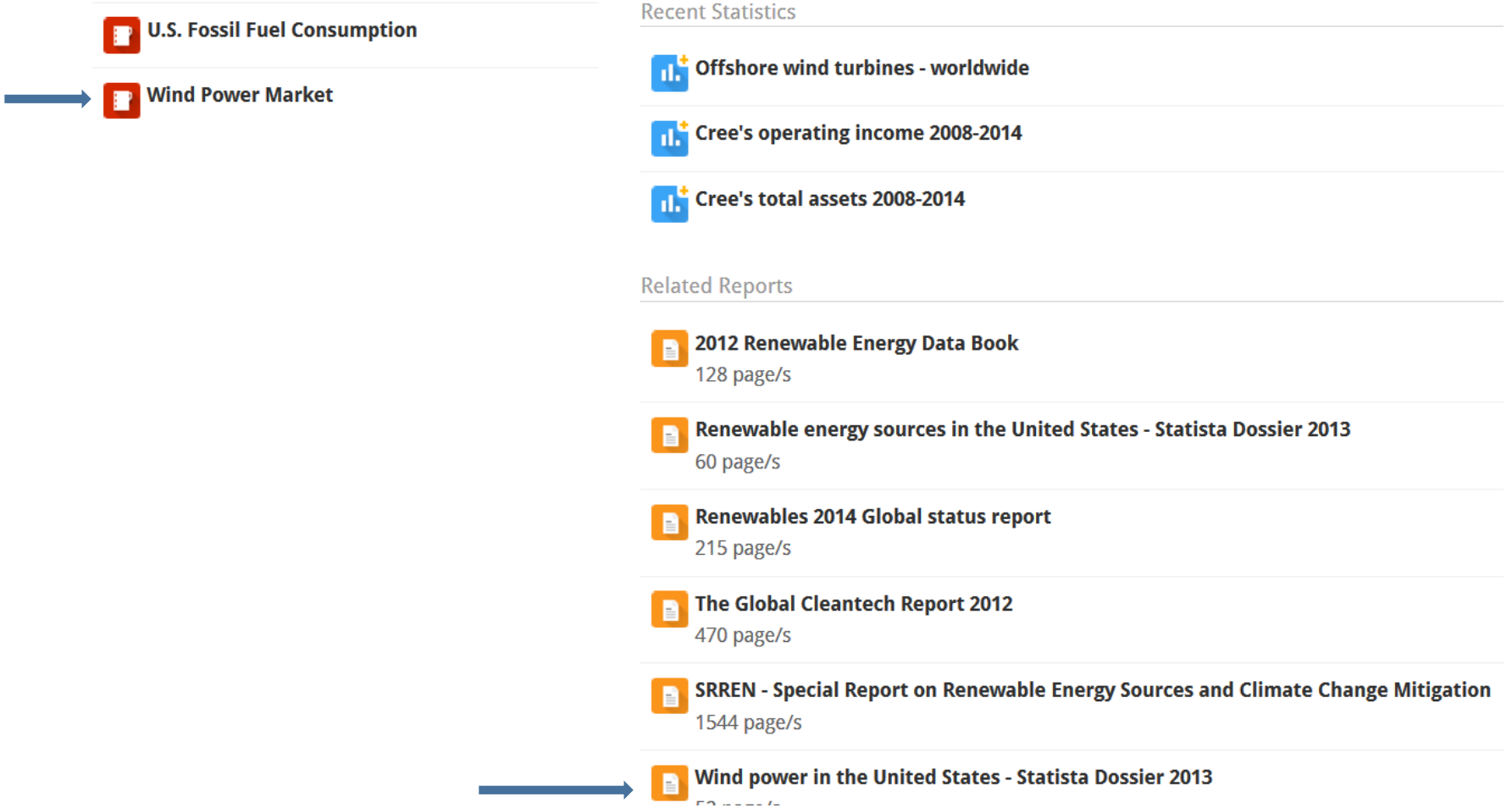
MIT Libraries

Statista: Wind in Colorado



MIT Libraries

But you also get



MITLibraries

A table from GlobalData Power

Upcoming Nuclear Reactors in India
The following table lists upcoming nuclear reactors that will boost India's nuclear installed capacity.

Table 1: Power Market, India, Upcoming Nuclear Reactors, 2014–2020

Reactor name	Type	Capacity (MW)	Status	First commercial year of operation
Jaitapur 1	PWR	1,700	Financed	2018
Jaitapur 2	PWR	1,700	Financed	2019
Kovvada 1	BWR	1,600	Permitting	2019
Kovvada 2	BWR	1,600	Permitting	2020
Mithi Virdi 1	PWR	1,250	Permitting	2019
Mithi Virdi 2	PWR	1,250	Permitting	2020
Haripur 1	PWR	1,200	Announced	2019
Kudankulam 3	PWR	1,050	Financed	2019
Kudankulam 4	PWR	1,050	Financed	2020
Kudankulam 5	PWR	1,050	Permitting	2019
Kudankulam 1	PWR	1,000	Under construction	2014
Kudankulam 2	PWR	1,000	Under construction	2015
Rajasthan, RAPS 7	PHWR	700	Under construction	2016
Rajasthan, RAPS 8	PHWR	700	Under construction	2016
Kakrapar 3	PHWR	700	Under construction	2015
Kakrapar 4	PHWR	700	Under construction	2015
Chutka 1	PHWR	700	Announced	2020
Kalpakkam 1	FBR	500	Under construction	2015
Kalpakkam 2	FBR	500	Announced	2019
Kalpakkam 3	FBR	500	Announced	2020
FBR 4	FBR	500	Announced	2017

Almost the End: Are there

Thoughts?

Questions?

Friendly Advice from UTFs

??!

MITLibraries

Enjoy!

MIT Libraries


Education is the most powerful weapon
that can be used to change the world.
Nelson Mandela
2014

Links to thousands of articles

MITLibraries

Assignment 4

- Posted on the Mission 2018 Wiki
- Contains an exercise to familiarize you with the MIT libraries
- Please complete Exercise by Sept. 29
- On Oct. 1, your group will give a 5 minute presentation on the one or two most relevant articles found during your library searches

MITLibraries