THAR SHE (USED TO) BLOW

EXELON'S FIRST WIND DECOMMISSIONING PROJECT

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AHMP
ALLIANCE OF HAZARDOUS MATERIALS PROFESSIONALS™
Global leadership for a sustainable future™

2018 National Conference
August 28, 2018

Exelon Generation®

Exelon Wind 1, 2, 3

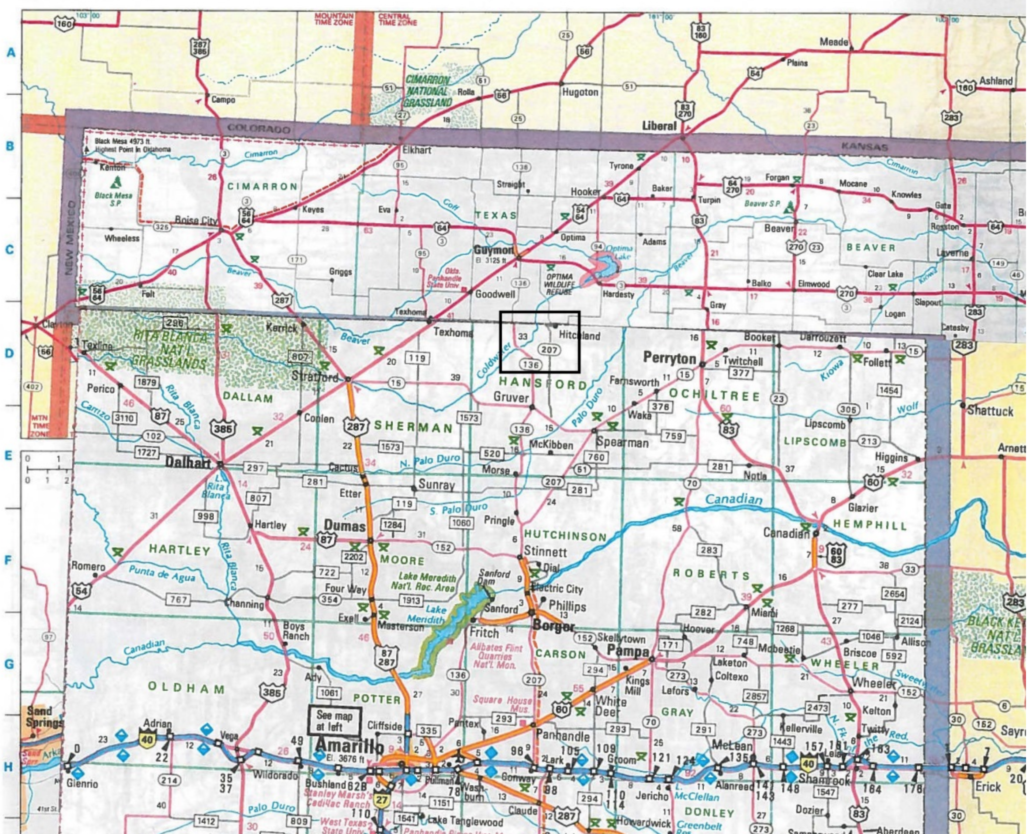
- Location – North Texas Panhandle (spittin' distance from Oklahoma)

Mileage Between Principal Cities

	Ada	Altus	Amarillo TX	Ardmore	Bartlesville	Dallas TX	Duncan	Durant	Elk City	Enid	Fort Smith AR	Guymon	Hot Springs N P AR	Hugo	Joplin MO	Lawton	McAlester	Miami	Muskogee	Norman	Oklahoma City	Ponca City	Shawnee	Stillwater	Tulsa	Wichita KS	Wichita Falls TX	Woodward
Enid	173	198	262	190	135	296	140	244	148		231	213	379	287	227	143	223	200	165	112	93	68	123	64	115	122	195	86
Lawton	115	56	213	107	238	190	34	161	123	143	268	301	367	216	304		174	277	227	73	89	194	124	153	192	247	52	176
Muskogee	126	281	395	191	96	239	224	145	247	165	70	378	218	134	118	227	67	91		157	138	142	108	120	50	225	279	251
Oklahoma City	85	143	259	97	149	209	86	151	109	93	180	263	327	177	215	89	128	188	138	19		105	35	64	105	157	141	136
Tulsa	118	246	360	183	46	263	189	165	212	115	116	328	244	155	112	192	91	85	50	122	105	92	90	70		174	244	201

Selected Recreational & Historical Sites

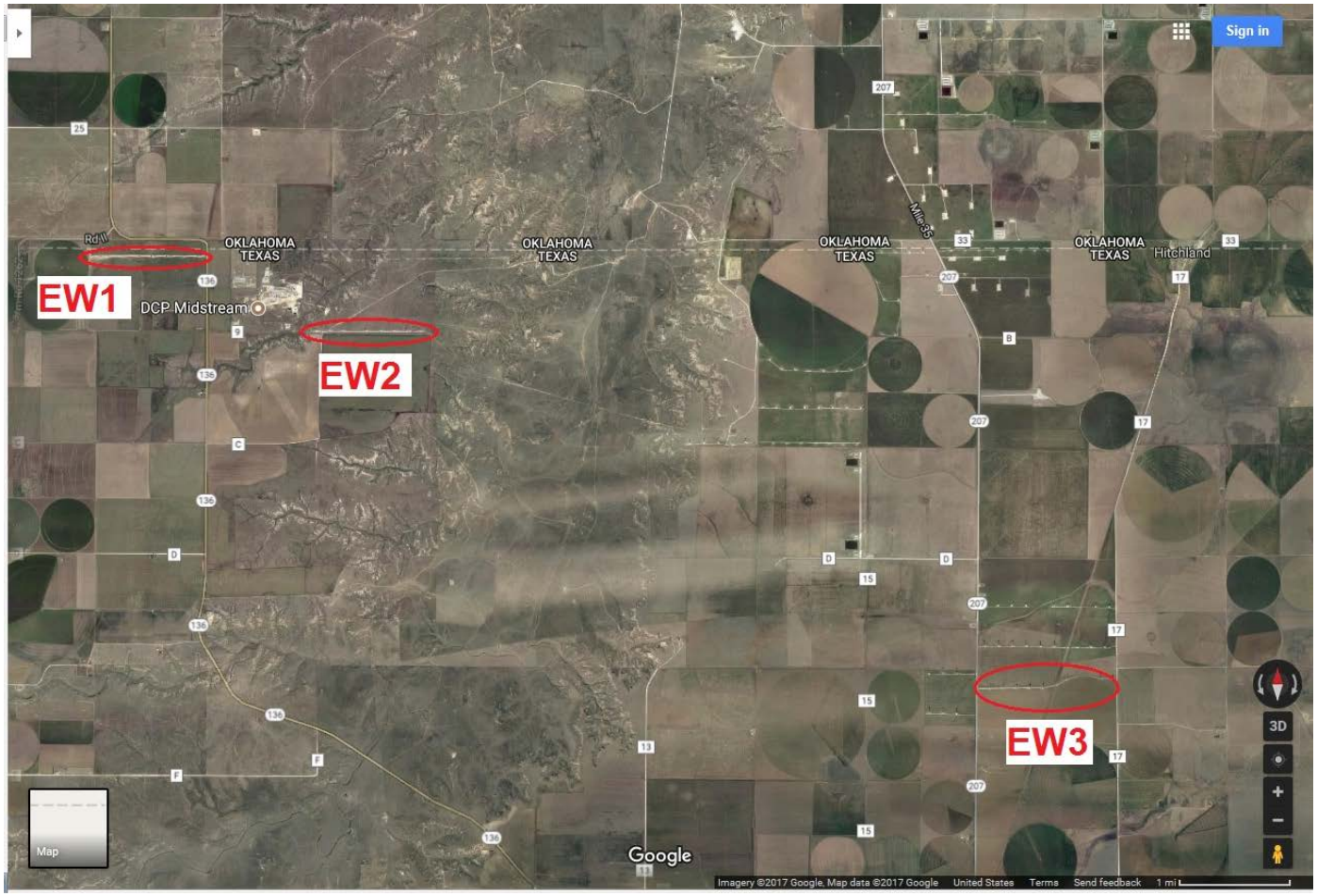
Alabaster Caverns State Park, C-12
Arbuckle Mountains/Turner Falls, K-18
Black Mesa, B-1
Chickasaw National Recreation Area, K-18
Discovery Land (outdoor musical theater), E-2
Gilcrease Museum of American History & Art,
Great Salt Plains National Wildlife Refuge, C-1
Illinois River, E-24



Exelon Generation

Exelon Wind 1, 2, 3

- Location – North Texas Panhandle - land uses



Exelon Generation

Exelon Wind 1, 2, 3 – Adjacent Land Uses

Ag Feed crops:

Sorghum
Corn
Soybeans
Winter wheat
Hay

- Cattle
  (lovable, aren't they?

Site description

- General layout of wind farms

Site description

- Tower orientation

Site description

- Roadway

Site description

- Roadway construction:
  - 16 FT wide x 1 FT deep x 1 mile long trench
  - Soil rolled into adjacent farm/crop land.
  - Caliche replaced soil & compacted to form roadbeds

Site description – roadway material

- Caliche – a sedimentary rock, a hardened **natural cement** of calcium carbonate that can bind with other materials (soil, sand, gravel).

- Roadways are therefore, hard as CONCRETE! (at least when dry)

Wind Tower description – Tower

- Height 72 meters
  - 4 sections – 18 m long
  - Tower diameter - 4.15m – 2.45 m

Wind Tower description – Tower

- Tower interior
  - **BIG** tube
  - Ladder
  - Cables

Wind Tower description – Nacelle

- Dimensions:

  Length 8.3 m

  Width 3.2 m

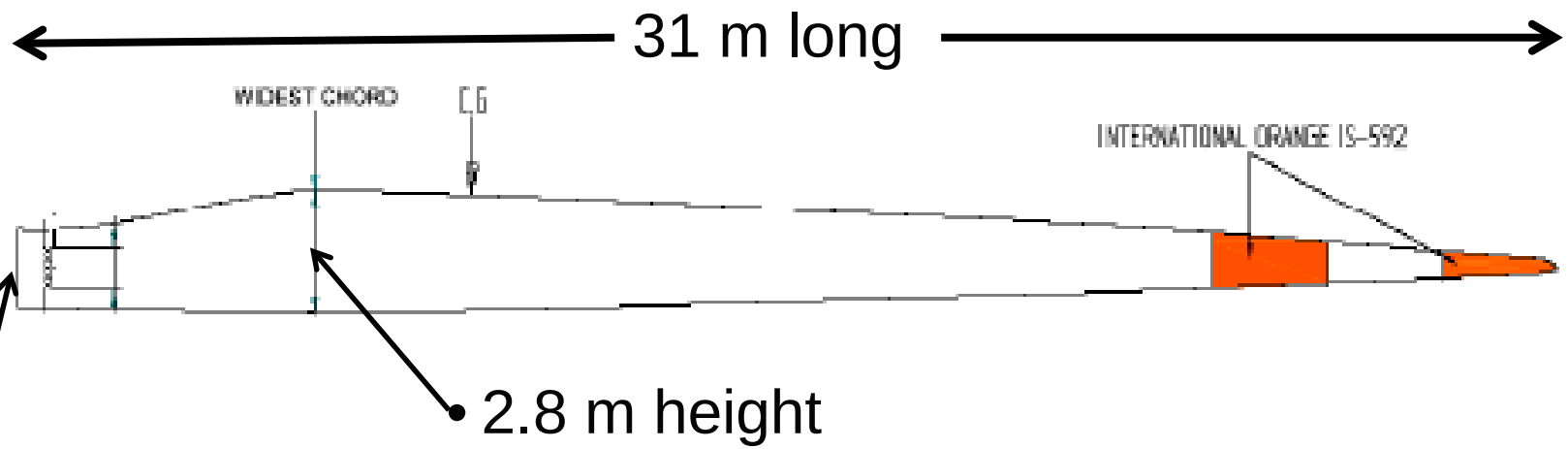
  Height 3.6 m

Wind Tower description – Tower base

- Steel re-enforced concrete
- 12-18 ft deep
- Base diameter - 4.15m – 2.45 m

Wind Tower description – Turbine blades

Each blade occupies a large amount of “air space”



- 1.67 m width (at base)

Wind Tower description - weights

- Weight (lbs)

• Tower	230,694
• Nacelle	97,709
• Hub	20,278
total	355,295

Decommissioning Options

- Felling (explosives)
  - More difficult to reuse components
  - Safety concerns
  - Debris containment – crop damage
  + Lower cost

- Crane dismantlement
  - Higher cost; susceptible to wind delays
  - Safety concerns - work at heights
  + Process can be stopped immediately
  + Undamaged components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CRANE
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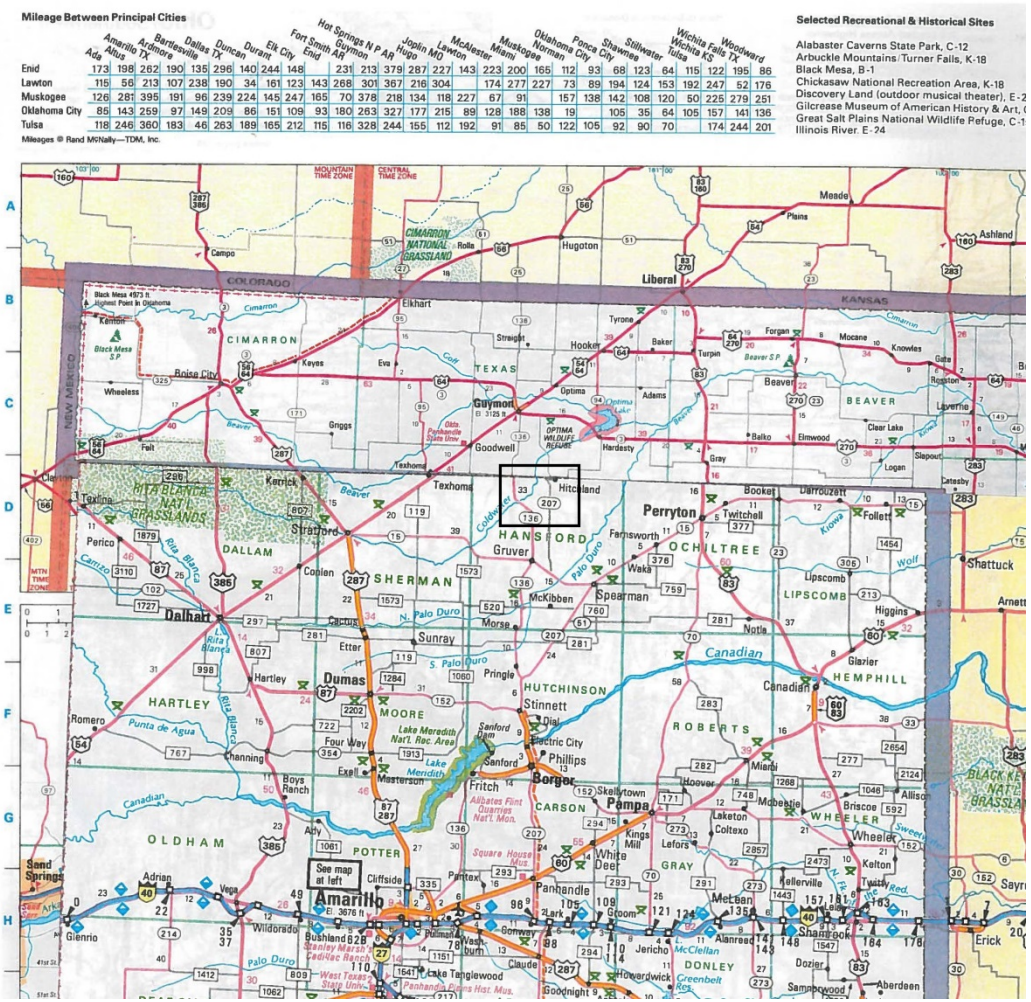
OPERATIONAL CHALLENGE #1 – geographic location, north Texas almost in Oklahoma



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Mileages © Rand McNally—TDM, Inc.

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OPERATIONAL CHALLENGE #2 – WEATHER - WIND

OPERATIONAL CHALLENGE #3 – WEATHER - RAIN

3:20 PM

OPERATIONAL CHALLENGE #3 – WEATHER-RAIN

6:51 PM

OPERATIONAL CHALLENGE #4 – AVOID INTERFERENCE WITH FARMING

- AVOID FARM OPERATIONS
  - Growing season – May through late Sept
  - Active crop farming adjacent to all sites (used as forage areas in winter)
  - Avoid interfering with crop planting or harvest operations

OPERATIONAL CHALLENGE #5 – distance to recycling markets

- Recyclers in area –
  - Two small operations; two larger recyclers
    - Large recyclers not interested in towers
    - Small recyclers – can they manage heavy towers?
  - Larger downstream recyclers distant
    - Closest LARGE downstream recycling operations – Ft. Worth, Denver

OPERATIONAL CHALLENGE #6 – Laydown areas access

- Area occupied by:
  - 72 blades ~ 1.1 acre
  - 24 towers ~ 1 acre
  - 24 Nacelles & hubs ~ 0.2 acre
  - Need ~ 2.3 acres (8985 m^2) total
    (Roughly area of 1 ¾ football fields)

ENVIRONMENTAL CHALLENGE #1 – restoration of farm & ranch lands

- Removal of roadways
  - Several landowners elected to have roadways remain
- Replace with “clean soil”
  - Source of “clean soil” w/o bindweed was problematic
- Relocate/reuse caliche
  - Stockpile for ranchers’ use
  - Reuse in rebuilding some of access roads

ENVIRONMENTAL CHALLENGE #2 – ensuring clean soil (invasive weed species)

Bindweed

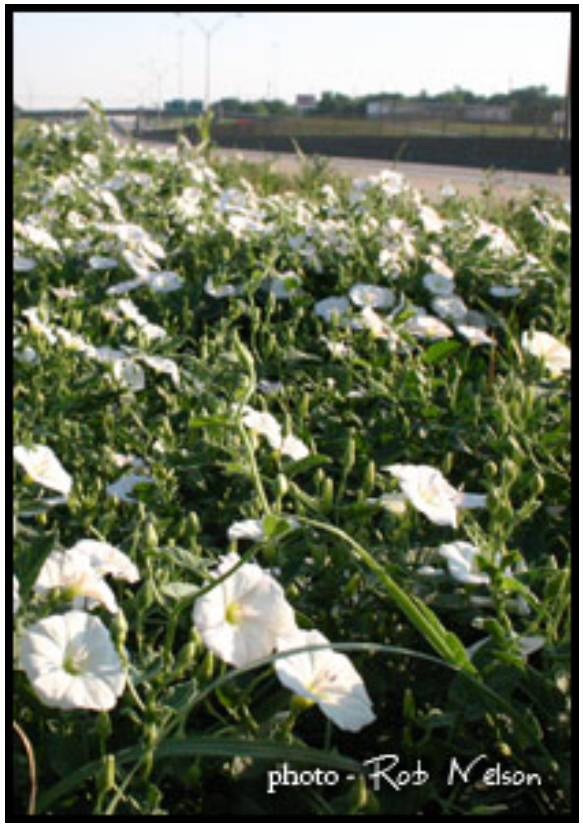
Convolvulus arvenis

Climbing, creeping vine

Spreads via rhyzomes and seeds (perennial)

Deep roots (~8-9 ft)

Strangles crops, persistent



ENVIRONMENTAL CHALLENGE #3 – Landfill availability for non-recyclables (blades)

- Only 3 municipal landfills in N Texas/OK/Kansas area:
  - Spearman Landfill, Spearman TX - ~ 20 miles
  - Amarillo City Landfill, Amarillo TX -~ 100 miles
  - Seward Co. Landfill, Liberal KS -~ 75 miles
- **NO COMMERCIAL LANDFILLS!**
- Sale for reuse is now best option!!

Questions ?