CEDAR POINT WIND FARM

Project Supply Chain case study by:

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PROJECT SNAPSHOT

🌍 Location:

- Limon and Cheyenne Wells area, eastern Colorado , USA
- Situated across Lincoln, Elbert, and Arapahoe counties

⚡ Capacity

- 252.3 megawatts (MW)
- Powers approx. 80,000 homes annually

🏢 Developer / Owner

- Originally developed by **Renewable Energy Systems Americas (RES Americas)**
- Later acquired and operated by **Enbridge Inc.**, a Canadian energy infrastructure company

📅 Timeline

- **Start of Construction**: Mid-2010
- **Commissioned / Operational**: September 2011
- **Total Duration**: ~14 months

🏗 Project Type:

- Onshore Wind Farm
- Includes both **generation infrastructure** (wind turbines) and **transmission infrastructure** (substation + 42-mile transmission line)

🔧 Components & Scale

- 139 Vestas V90 wind turbines
- 42 miles of new 230-kV transmission line
- Two substations constructed

⚙️ Turbine Manufacturer

Vestas

- Blades: Windsor, Colorado
- Nacelles and hubs: Brighton, Colorado
- Towers: Sourced from local U.S. suppliers

💰 Project Cost (Estimated)

- Approx. **$500 million USD**
    - Includes land development, turbine supply, construction, transmission, and labor

PROJECT OBJECTIVES

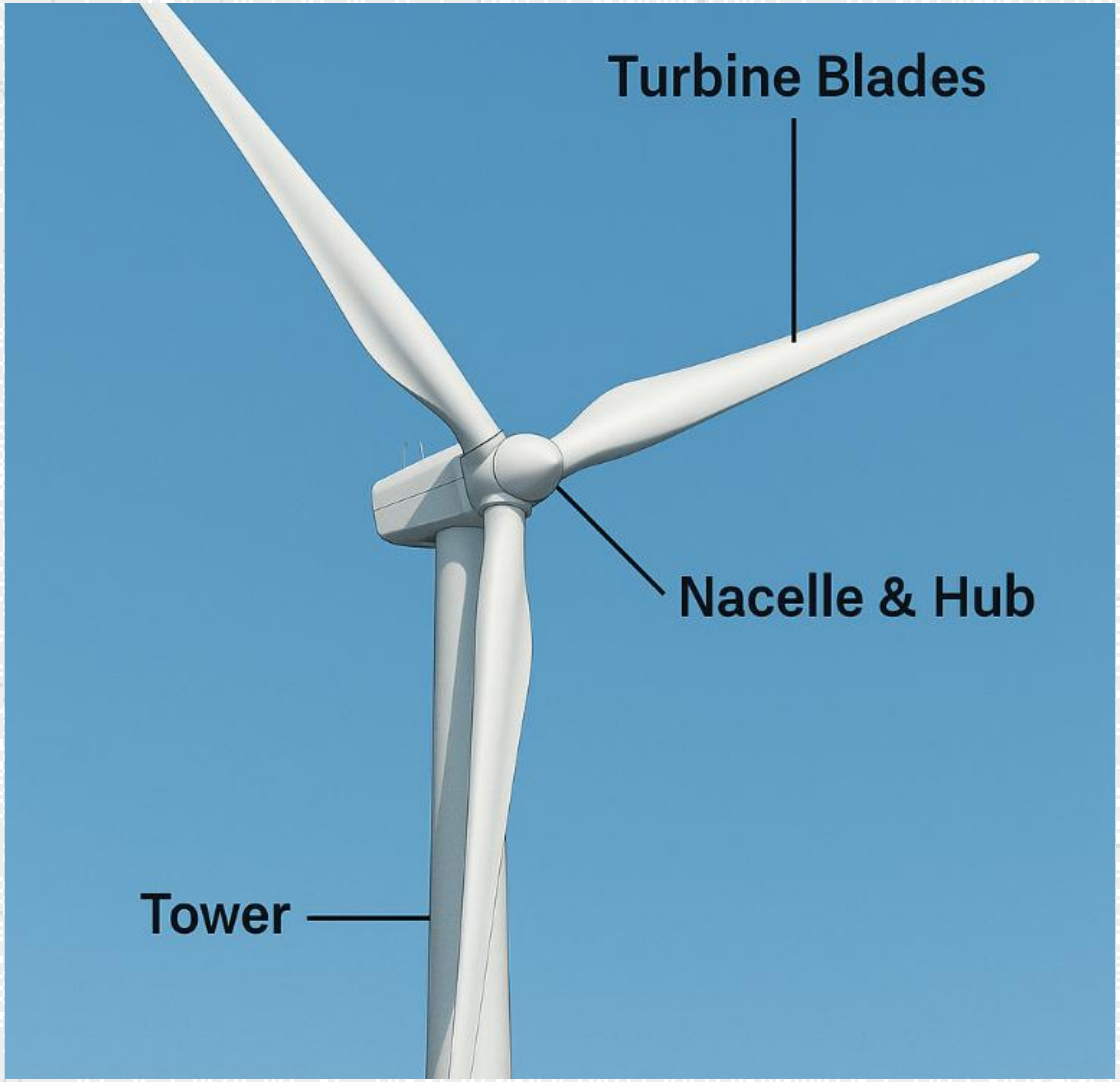
- Deliver clean, renewable energy to Colorado's grid
- Support Colorado's Renewable Portfolio Standard (RPS) targets
- Boost local manufacturing and create jobs
- Demonstrate effective integration of local supply chain into utility-scale renewable project

SUPPLY CHAIN OVERVIEW

- Component Sourcing.
- Logistics & Transport
- Supply Chain Strategies

COMPONENT & SOURCING

Component	Source Location	Why?
Turbine Blades	Vestas plant in Windsor, CO	Close to site = low transport cost & time
Nacelles & Hubs	Vestas plant in Brighton, CO	Heavy, complex parts — local sourcing crucial
Towers	Likely from Pueblo, CO or nearby	Local steel suppliers, less import dependency



LOGISTICS & TRANSPORT

- **Turbine blades** are *massive* (~44m each). These require:
- **Specialized flatbed trailers**
- **Route planning** to avoid tight turns or bridges
- **Timing coordination** with site construction

- **Land-based transport**:
- Used trucks for all movements (no rail or air)
- Likely used staged deliveries based on foundation readiness

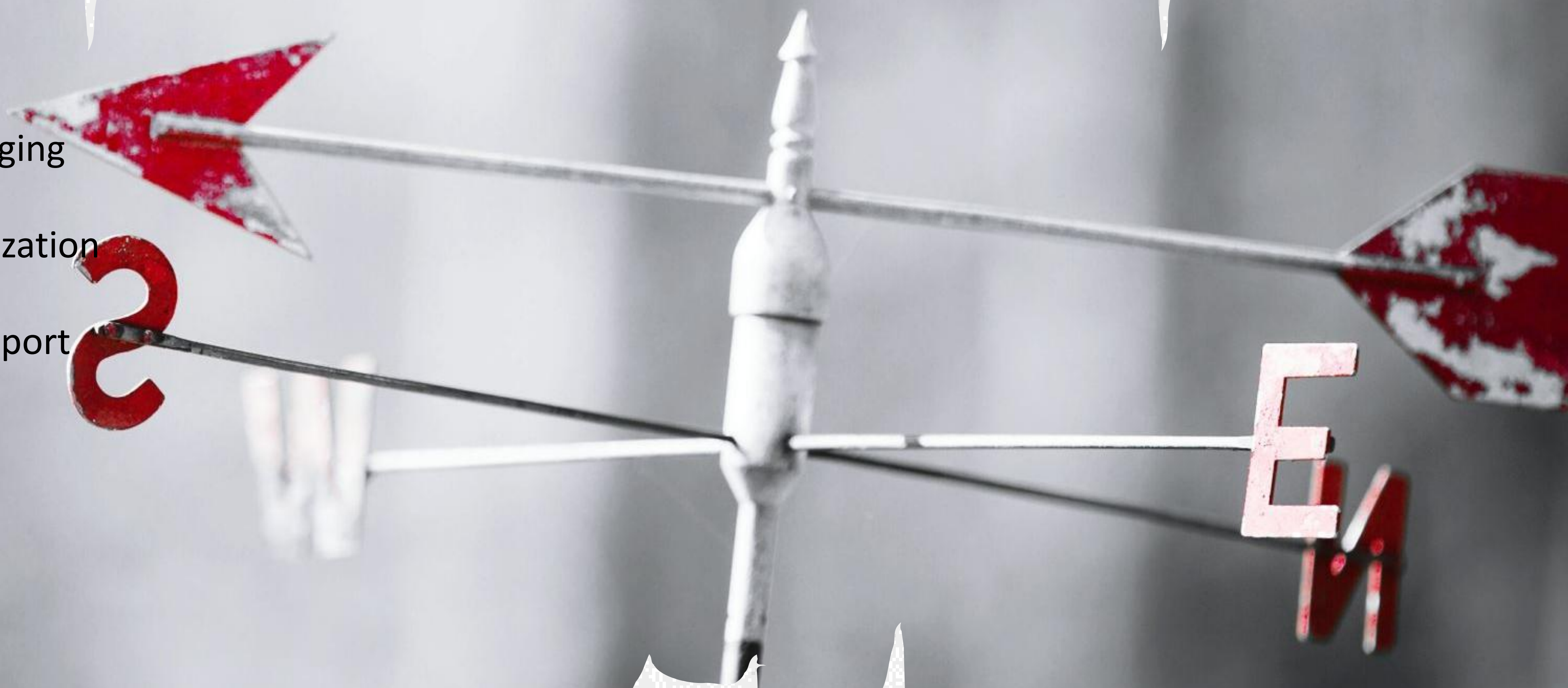
SUPPLY CHAIN STRATEGY

- This is where SCM made the difference.

Strategy	Purpose
Local Manufacturing	Reduce lead time, support Colorado job creation
Rolling Wave Planning	Deliver turbines as needed (not all at once)
Supplier Coordination	Keep tight alignment to avoid on-site storage
Weather Considerations	Schedule delivery and lifts in calm periods

KEY SCM CHALLENGES – CEDAR POINT WIND FARM

- Tight Construction Timeline
- Supplier Coordination & Staging
- Transmission Line Synchronization
- Oversized Component Transport
- Weather Constraints



KEY SCM CHALLENGES – CEDAR POINT WIND FARM

Tight Construction Timeline

- **Challenge**:
  The project was completed in ~14 months — fast for a 252 MW wind farm.
- **SCM Risk**:
  Any delay in supply delivery would idle labor, cranes, or cause sequential disruption.
- **Mitigation**:
- **Rolling Wave Planning**: Deliver in stages aligned with progress
- Agile coordination between site teams and manufacturers
- Buffer built into turbine delivery windows

Supplier Coordination & Staging

Supplier Coordination & Staging

- **Challenge**:
  Multiple component types coming from different cities (Windsor, Brighton, possibly Pueblo).
- **SCM Risk**:
  Mismatch in arrival timing = on-site storage overload or idle teams.
- **Mitigation**:
- Close alignment with Vestas' delivery schedule
- Construction staging areas near turbine pads
- Use of nearby warehousing only when necessary

KEY SCM CHALLENGES – CEDAR POINT WIND FARM

Weather Constraints

- **Challenge**:
  Windy conditions are *ideal* for energy generation — but terrible for crane lifts and blade installation.
- **SCM Risk**:
  If deliveries arrive during high-wind periods, equipment can't be installed.
- **Mitigation**:
- Weather monitoring linked to delivery and lift planning
- Rescheduling flexibility with local suppliers
- Use of downtime for foundation prep or electrical work

Transmission Line Synchronization

- **Challenge**:
  Even if turbines are ready, the power must flow — so substations and the 42-mile transmission line must be operational too.
- **SCM Risk**:
  Grid connection delay = completed project with zero output.
- **Mitigation**:
- Parallel construction scheduling with transmission crew
- Joint critical path planning (generation + connection)
- Backup delivery timelines for transformers/switchgear

PLANNING METHODOLOGY – CEDAR POINT WIND FARM

- Rolling Wave Planning in Action
- Schedule-Driven Material Flow
- Risk Buffers Embedded in Delivery Plan
- Integration with Transmission Planning

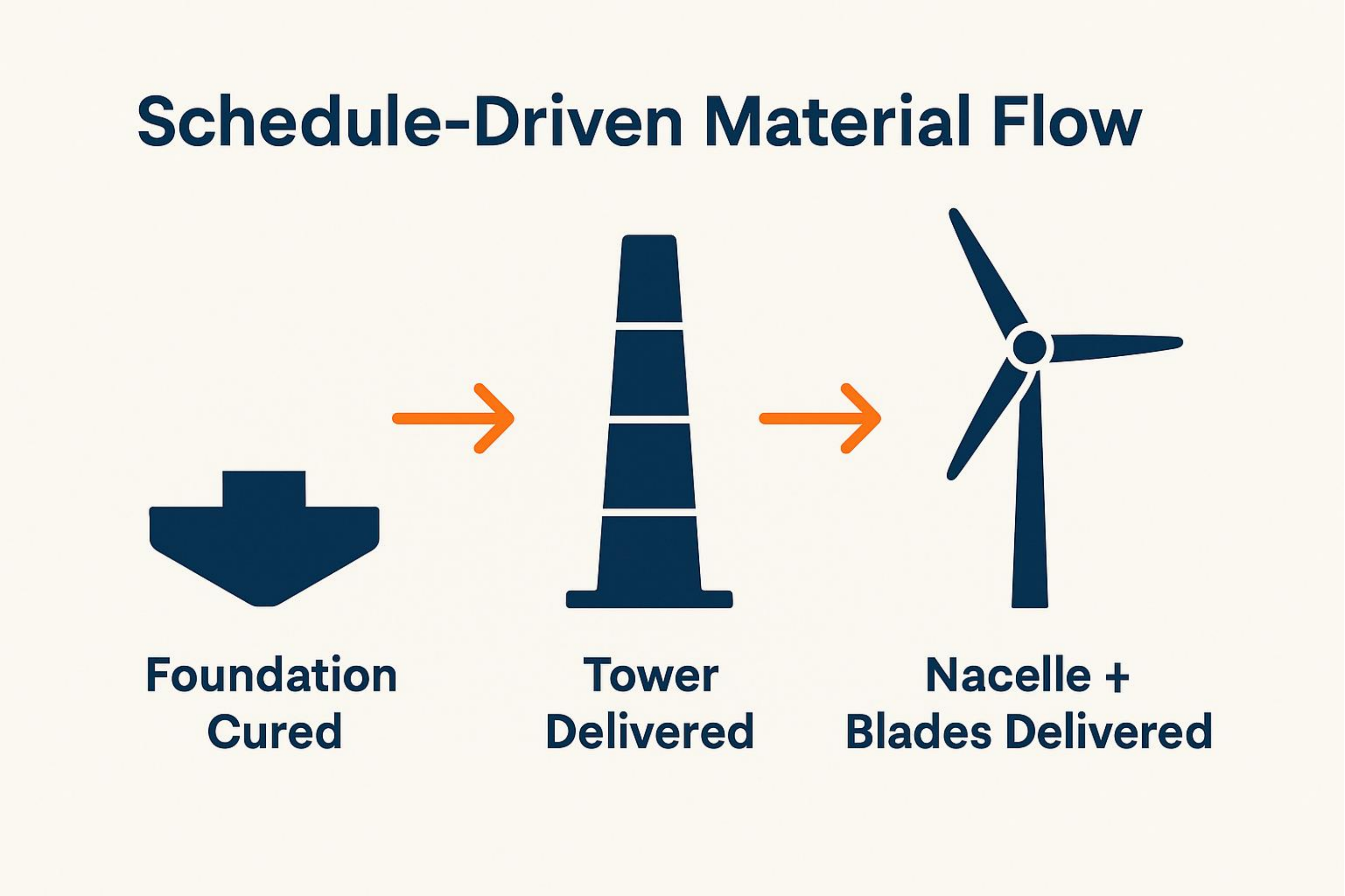
PLANNING METHODOLOGY – CEDAR POINT WIND FARM

Rolling Wave Planning in Action

- **Definition:**
  Rolling Wave Planning is an iterative project planning method where detailed planning is done for near-term tasks, and longer-term work is planned at a higher level until it's closer to execution.
- **How it applied at Cedar Point**:
- Only the **first wave of turbine deliveries** were scheduled during early construction.
- As foundations were poured and pads were ready, the **next batch** of components were ordered and shipped.
- Reduced risk of **over delivery** or onsite congestion.

PLANNING METHODOLOGY – CEDAR POINT WIND FARM

- **Schedule-Driven Material Flow**
- SCM aligned to **site readiness milestones**:
  - Foundation cured → tower delivered
  - Tower up → nacelle + blades delivered
- Delivery not calendar-based, but **progress-based**



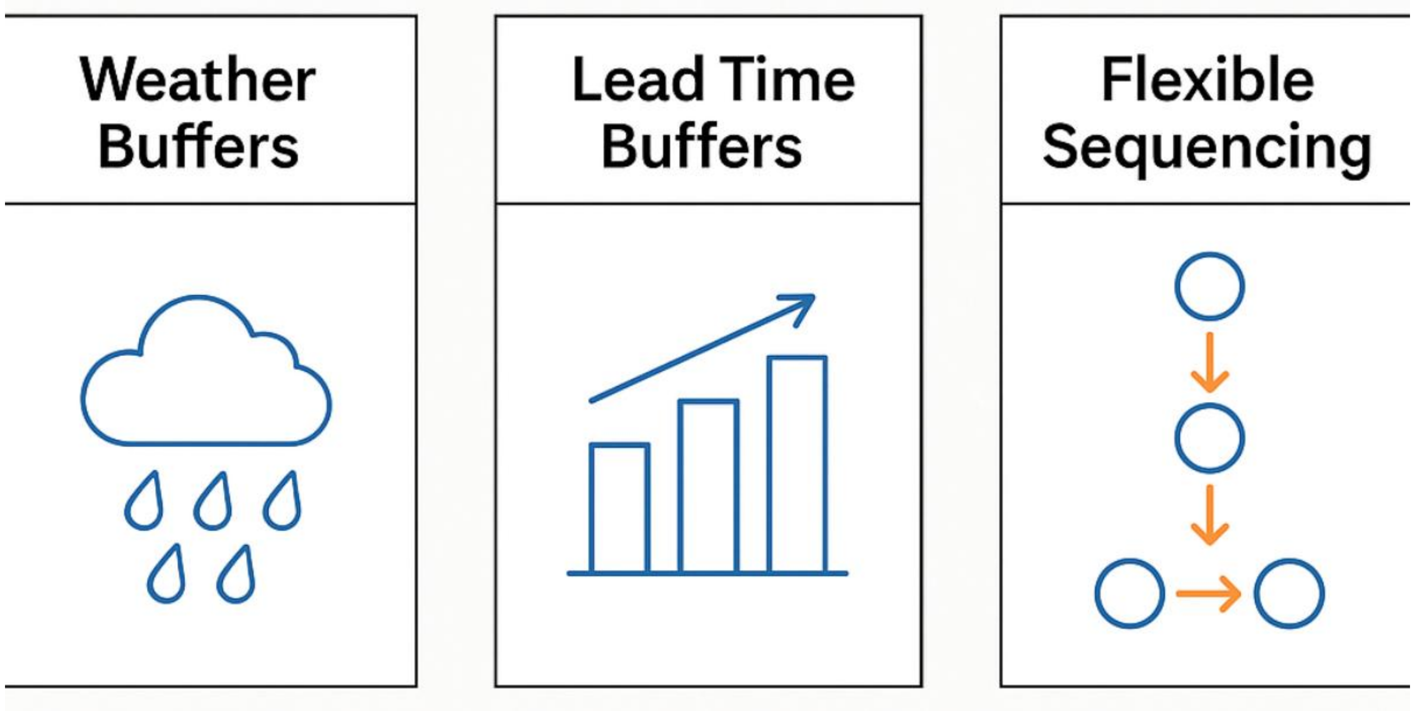
PLANNING METHODOLOGY – CEDAR POINT WIND FARM

Risk Buffers Embedded in Delivery Plan

- **Weather buffers** built into crane and lift schedules
- **Lead time buffers** from nearby suppliers enabled flexible re-sequencing
- SCM team created **wiggle room without bloating costs**

The real power in Cedar Point's planning was how it disguised buffers as efficiency — everything moved fast, but it wasn't rushed.

Risk Buffers Embedded in Delivery Plan

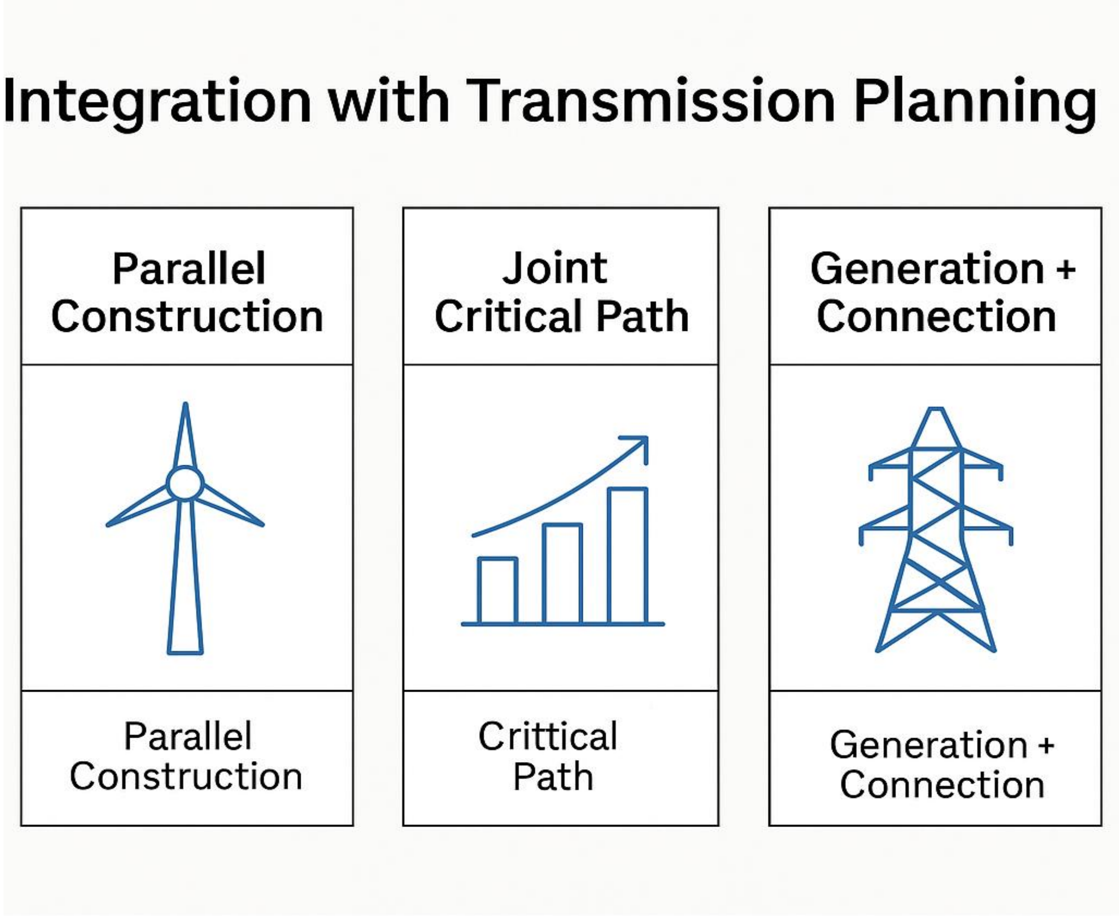


PLANNING METHODOLOGY – CEDAR POINT WIND FARM

Integration with Transmission Planning

- Substation and transmission line crews worked **in parallel**, not in sequence
- Grid tier wasn’t a Phase 2 — it was a critical path activity

Even the best turbine setup is a zero if the grid’s not ready. Cedar Point treated transmission as part of the same wave — not a separate project.



PROJECT OUTCOMES – CEDAR POINT WIND FARM

- On-Time Completion
- Budget Control
- Job Creation and Local Economy
- Clean Energy Impact
- Operational Reliability (Post-Launch)

PROJECT OUTCOMES – CEDAR POINT WIND FARM

On-Time Completion

- **Timeline**: ~14 months (Mid-2010 to Sept 2011)
- Despite the scale (139 turbines + 42 miles of transmission line), the project met its **planned operational date**.

Clean Energy Impact

- **Capacity**: 252.3 MW
- **Homes Powered**: ~80,000 Colorado households
- Contributed meaningfully to Colorado's Renewable Portfolio Standard (RPS)

Budget Control

- Estimated cost: ~$500 million USD
- No major overruns reported
- Local sourcing and minimized storage/logistics inefficiencies helped manage cost variance

PROJECT OUTCOMES – CEDAR POINT WIND FARM

Job Creation and Local Economy

- Over **300 construction jobs** during the project
- Boosted **manufacturing facilities** in Windsor and Brighton (Vestas plants)
- Stimulated Colorado’s renewable energy economy

Operational Reliability (Post-Launch)

- Operational since 2011
- Integrated seamlessly into Xcel Energy’s transmission network
- No major reliability issues reported in first decade

LESSONS LEARNED – CEDAR POINT WIND FARM

- Local Supply Chains = Strategic Advantage
- Rolling Wave Planning Enables Agility
- Supply Chain is Part of the Critical Path
- Weather is a Supply Chain Variable

LESSONS LEARNED – CEDAR POINT WIND FARM

Local Supply Chains = Strategic Advantage

- **Lesson**: Sourcing turbines locally (Windsor, Brighton) shortened lead times, reduced transport risk, and boosted political and community support.

Rolling Wave Planning Enables Agility

- **Lesson**: By planning deliveries in waves, the team avoided bottlenecks, reacted to site readiness, and controlled resource deployment.

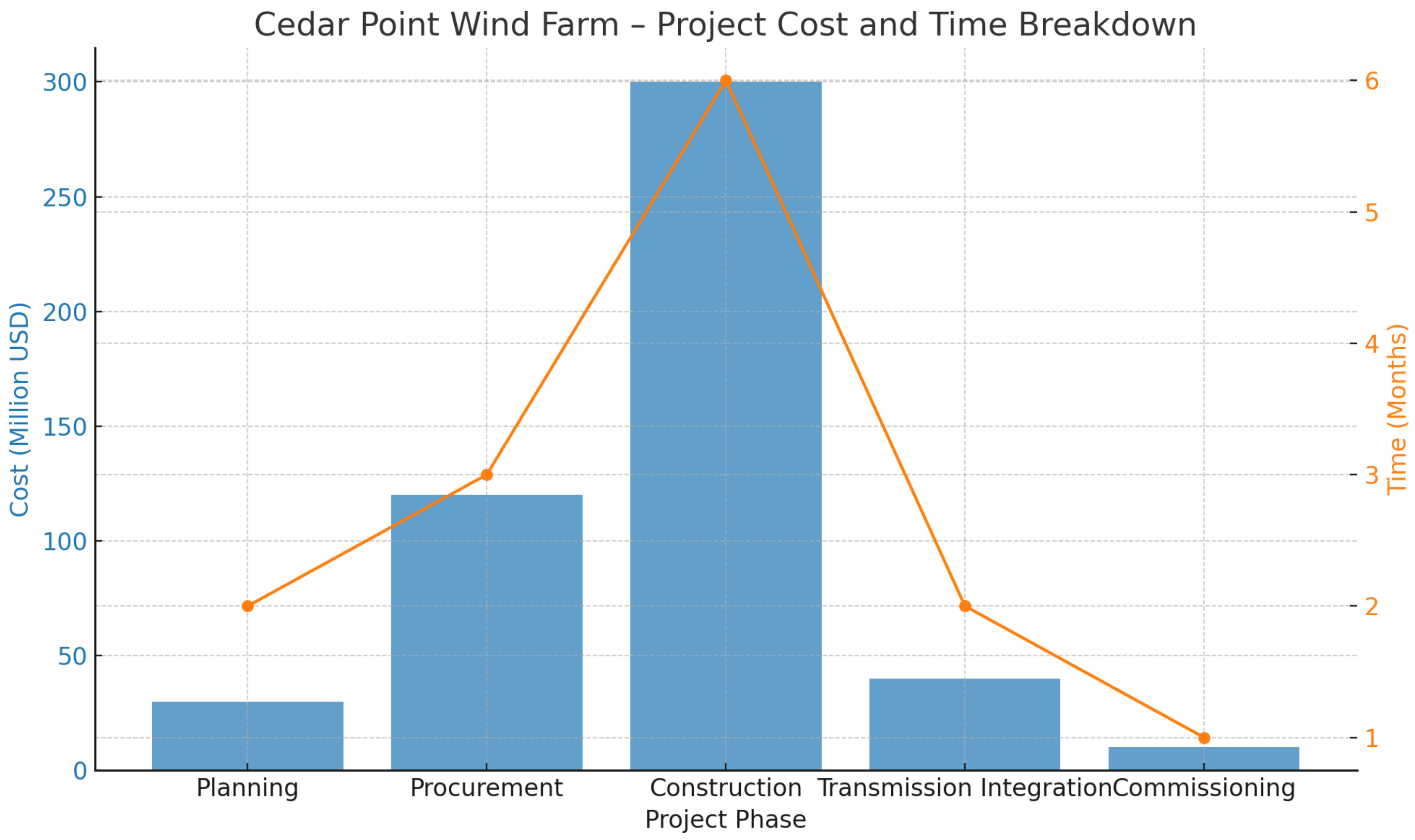
Supply Chain is Part of the Critical Path

- **Lesson**: The project’s success depended on supply and transmission being in sync — not sequenced separately.

Weather is a Supply Chain Variable

- Windy conditions are predictable — but lifts aren’t possible in high wind. SCM had to plan deliveries around crane-safe weather.

CLEAR POINT WIND FARM – CLEAN EXECUTION



The project met all major delivery, cost, and performance goals by aligning supply chain thinking with field realities.

This wasn’t just a clean energy project. It was a clean execution project — and that’s why it succeeded.

5 PILLARS OF SCM SUCCESS

LOCAL SUPPLY CHAINS

Sourcing components locally shortens lead times

ROLLING WAVE PLANNING

Phased planning allows for greater agility

CRITICAL PATH ALIGNMENT

Supply and project schedules must be synchronized

WEATHER CONTINGENCY

Planning for weather disruptions is essential

CLEAN EXECUTION

Aligning SCM with field conditions drives success

THANK YOU

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