



Private Renewable Energy Systems

European planning tools, permitting, regulations

counterpoint to

Best Practices and Observations from the US Context

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Spatial planning is neglected as a tool to implement renewable energy in the United States

Let's explore site selection, zoning, and regulation.

Policy learning is economically efficient -- saving US decision makers time and money.

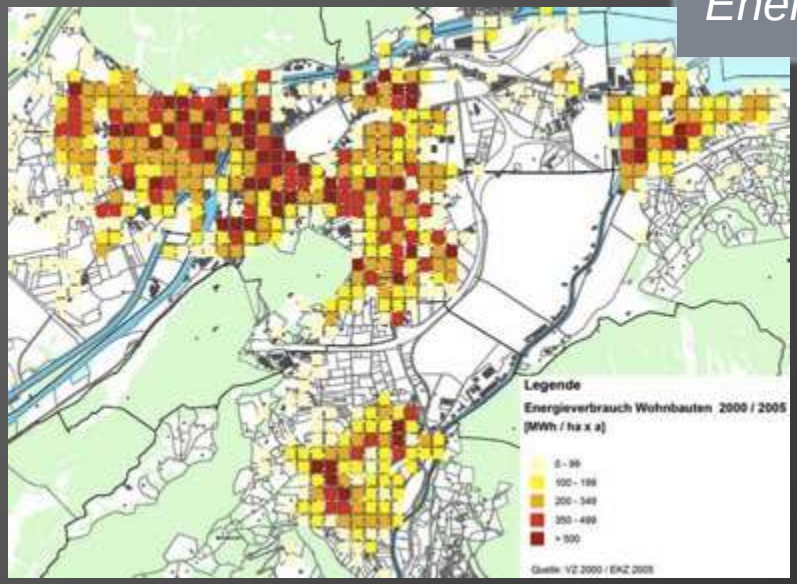
Rebated projects must be equipped with a meter to validate the public expense for rebates.

region

Spatially relevant energy
Consider generation facilities vis-à-vis location

Energy Logistics
Transportation of feedstocks w/in X radius

Energy Density
Potential generation capacity of the *Energyshed*



Consider technology.

Consider size.

Code stems from these.

Residential: <10 KW

Commercial: 100 KW - 1 MW

Utility: > I MW

Boulder's Building Energy Code

Applies to a variety of efficiency renewable technologies.
Affects commercial, residential, and multi-family residential construction.

Residential Code requires: New construction to be 30%-75% more efficient than the 2006 International Energy Conservation and Insulation Code (IECC) depending on building type and square footage (more stringent on McMansions)

Boulder, Slide 2:

Major renovations must achieve a Home Energy Rating System (HERS) score of 70-100 (15%-50% increased IECC efficiency) depending on square footage.

Commercial Code requires: Commercial energy efficiency to increase by 30% and energy modeling for building larger than 20,000 square feet.
Boulder awards Green Points for sustainable building practices. RE is optional.

Merton Rule

Onsite generation required of all new construction greater than 10,000 square feet

German Renewable Heat Act 2009

Residential and commercial

15% of demand: solar water heat

30% of demand: biomass heat

50% of demand: geothermal heat

1.2 million solar water heating systems

The U.S. Lags Behind in Promoting Solar Thermal and Geothermal Heat

Colorado's Solar Thermal Roadmap was launched in January, 2012.
As the country's "bull's eye" for solar thermal, Colorado's vision is to become a global leader in solar thermal adoption, installation, manufacturing and R&D.
See the roadmap at: http://cres-energy.org/pubs/solarthermalroadmap.pdf
While no direct federal solar thermal program exists, financial support is found in corporate tax deductions, credits, exemptions, and accelerated depreciation; grants; loans; manufacturing tax credits; and personal exemptions and tax credits.

Germany Uses Renewable Energy Power Purchase Agreements (REPPA's or FITs) under which:

RE generators sell power directly to the utility under long-term power purchase agreements.

The price of the power is based on the type of RE generation and fixed for the duration of the contract.

RE generators recover their investment plus a modest return in the price paid for power.

Germany, 2:
The offer price for RE generation declines as the cost of each generating technology declines.

RE generation capacity size is not restricted by historic power usage at the site.

Because utilities are required to purchase the RE offered, the cost of RE technologies declines over time as industries reduce costs and grow to maturity.

Dangerous “boom and bust” cycles are avoided or minimized in well-run REPPA systems.

Diverse ownership of RE generation is encouraged.

Colorado is one of 31 States with Renewable Portfolio Standards (RPS) under which:

Utilities are required to obtain a percentage of their retail electric sales from renewable energy by a certain date.

In Colorado

- 30% by 2020 (Investor-owned utilities)
- 10% by 2020 (Electric cooperatives)
- 10% by 2020 (Municipal utilities > 40,000 customers)

THE 2% ANNUAL RETAIL RATE INCREASE RULE HALTS RPS COMPLIANCE

- Rate increases from coal and gas plant investments are not limited (avg. 2-6% per year)
- Fuel costs are passed through directly to customers in the ECA rider (adds another 2-6% per year)

Colorado allocates 3% of retail sales by 2020 to distributed generation, with half (1.5%) serving on-site load (e.g., rooftop solar PV).

Net metering is available up to 120% of the customer's average annual consumption on IOU's. Munis and co-ops must net meter up to 25 kW for non-residential and 10 kW for residential.

Initial rebates and REC payments as high as $4.50 per watt applied.

Colorado RPS, Slide 2:

Current Xcel Energy incentives step down over time as certain MW targets are met.

Small customer-owned < 10 kW: $1.00/W plus $0.09 kWh
3rd Party-owned <10 kW: $0.12/kWh
Systems 10 kW up to 100 kW: Program on hold
Systems 100.1 kW up to 500 kW: Program on hold

Uncertain allocation of future generation capacity results in a “boom or bust” cycle for renewable energy technologies (i.e., the abrupt cessation of solar PV incentives in Colorado in February 2011).

Recoupment of investment in RE depends on uncertain assumptions about available incentives (moving target), the cost of RE technology, the current and projected price of electricity, and how long the customer will be at the location.

Customer uncertainty contributes to “boom or bust” cycle and stalls investment.

Greenfield Solar Development

Freiburg, Germany:
Order of development priority:
Rooftop
Brownfield
NO greenfield, until above exhausted

Habitat Friendly greenfield solar parks
-Audubon Society (NABU)
-German Solar Energy Industries Assoc.

The U.S. Environmental Protection Agency supports, but does not require, the use of brownfields for RE generation.

Local regulations create a complex maze of varying requirements to convert a brownfield to be used for RE generation.

Aesthetic Guidelines for Roof mounted solar

Berne Switzerland:

- limit the protrusion above the roofline to 20 cm or less;
- keep armatures and wires either invisible or camouflaged;
- avoid arrays shaped as an “L” or “U”;
- match arrays to the roof contour;
- promote modest, matte and dark color tones;
- encourage panels on side buildings or extensions, rather than main property.

website www.planningportal.gov.uk

Colorado Litigated Aesthetic Guidelines

Enacted in 1979, solar access laws prohibit residential covenants that restrict solar access.

In 2008, protection was extended to certain wind turbines and energy efficiency measures.

Aesthetic requirements that do not significantly increase cost or decrease performance are allowed, and attorney's fees are awarded to the prevailing party.

Property owners may agree voluntarily to solar easement with their neighbors to maintain access to sunlight.

Thesis | **Tools** | **Zoning** | Permitting | Record keeping | Metering | Taxation & Capitol

Renewable Generation Zones

1) Priority Region

2) Caveat Region

3) Wind generation priority zone; determined via expert review

4) Concentration zone

Bundle industrial developments that have already changed the landscape

COLORADO RENEWABLE ENERGY DEVELOPMENT ZONES

Statewide renewable energy zones were developed by the Governor's Energy Office and the legislature for utility-scale development.

Sacramento Municipal Utility developed an interconnection map showing optimal interconnection locations for renewable energy under its REPPA/FIT program.

Utilities can create RE zones by mapping their best interconnection locations.

Wide integration of RE requires an interactive distribution grid that matches renewable energy supply with energy demand, including demand reduction and energy storage.

Germany: no residential permitting

1 million residential installations between 2009 – 2011

No permit required

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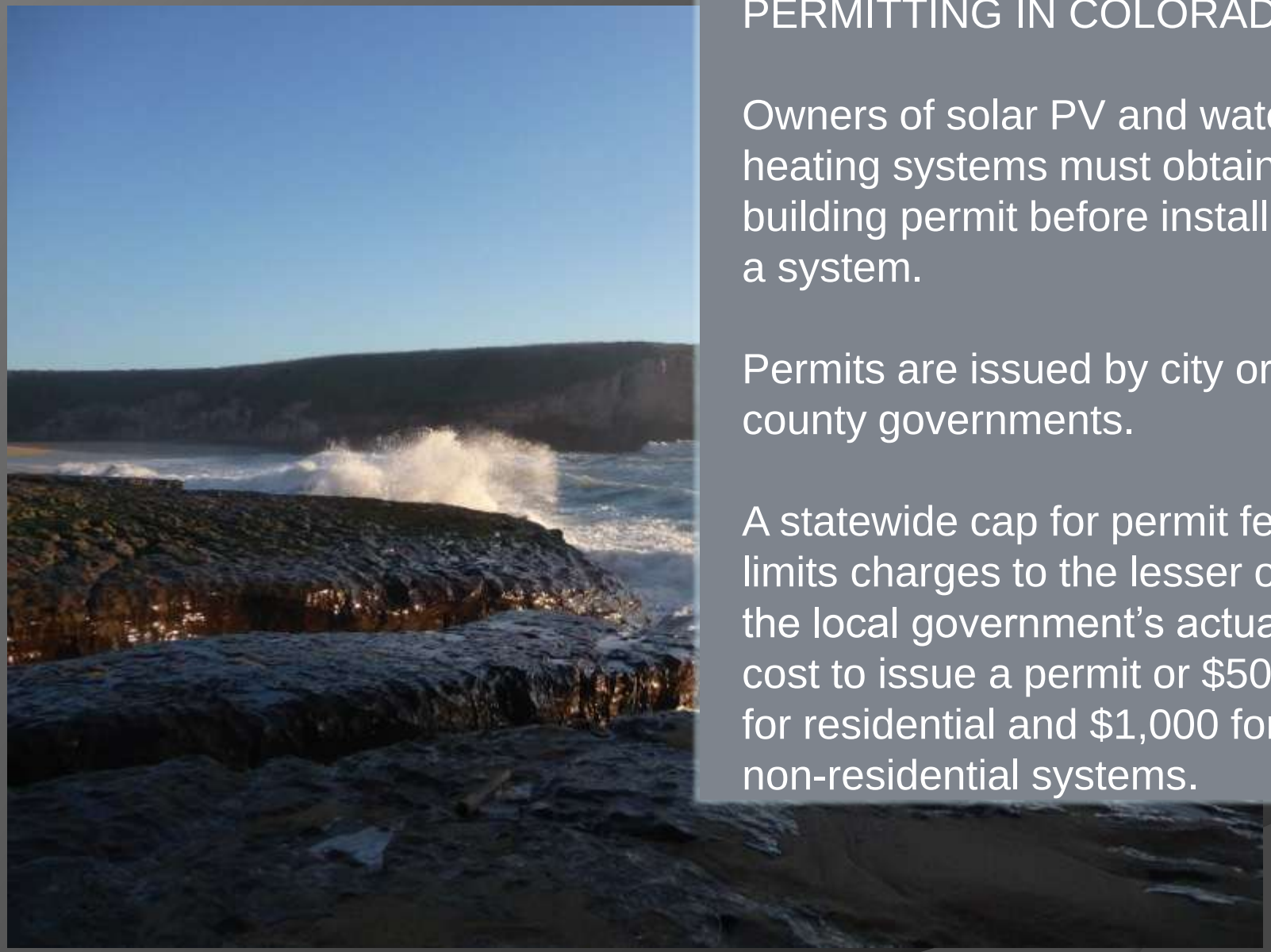
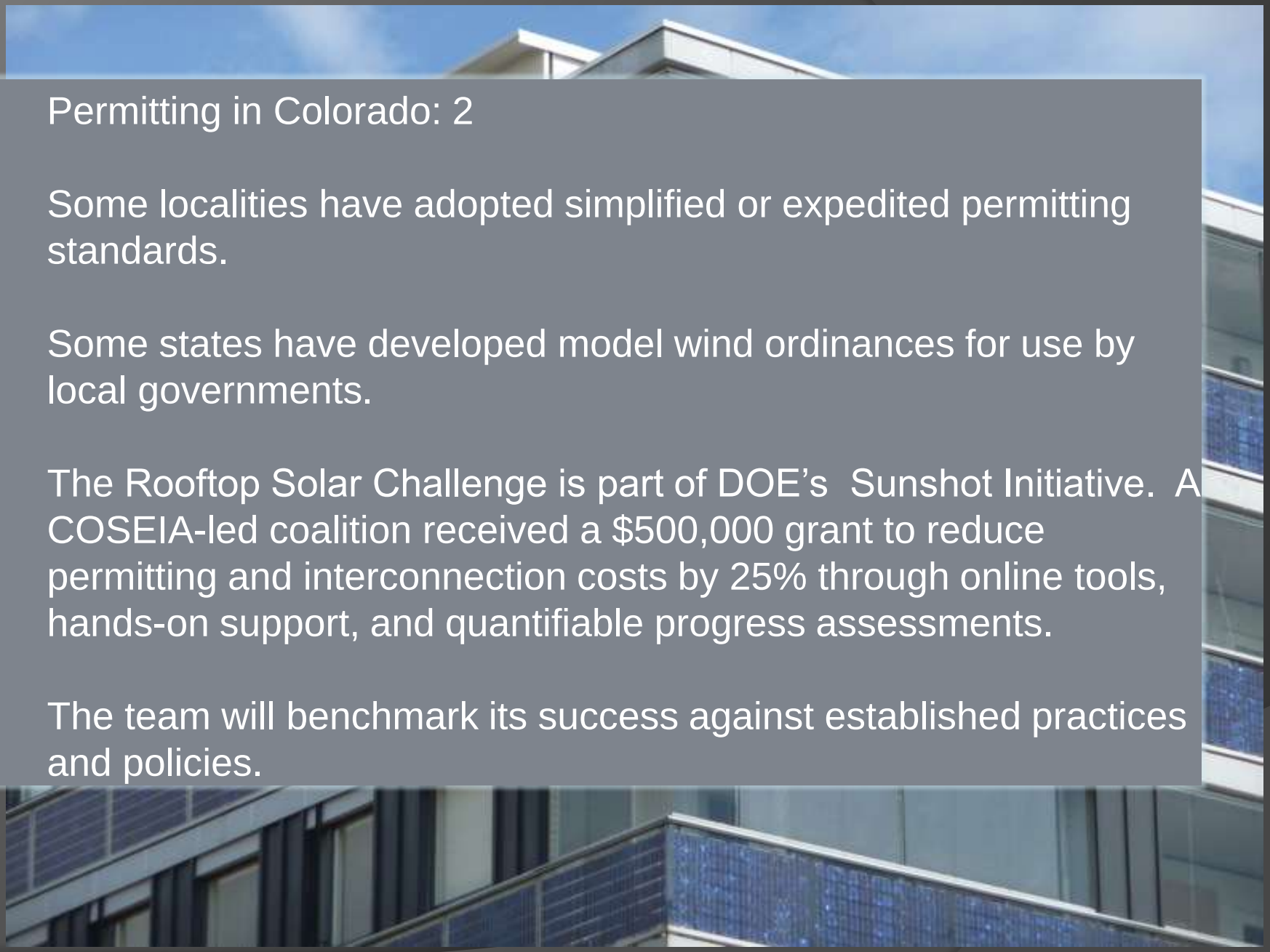


PERMITTING IN COLORADO

Owners of solar PV and water heating systems must obtain a building permit before installing a system.

Permits are issued by city or county governments.

A statewide cap for permit fees limits charges to the lesser of the local government's actual cost to issue a permit or $500 for residential and $1,000 for non-residential systems.



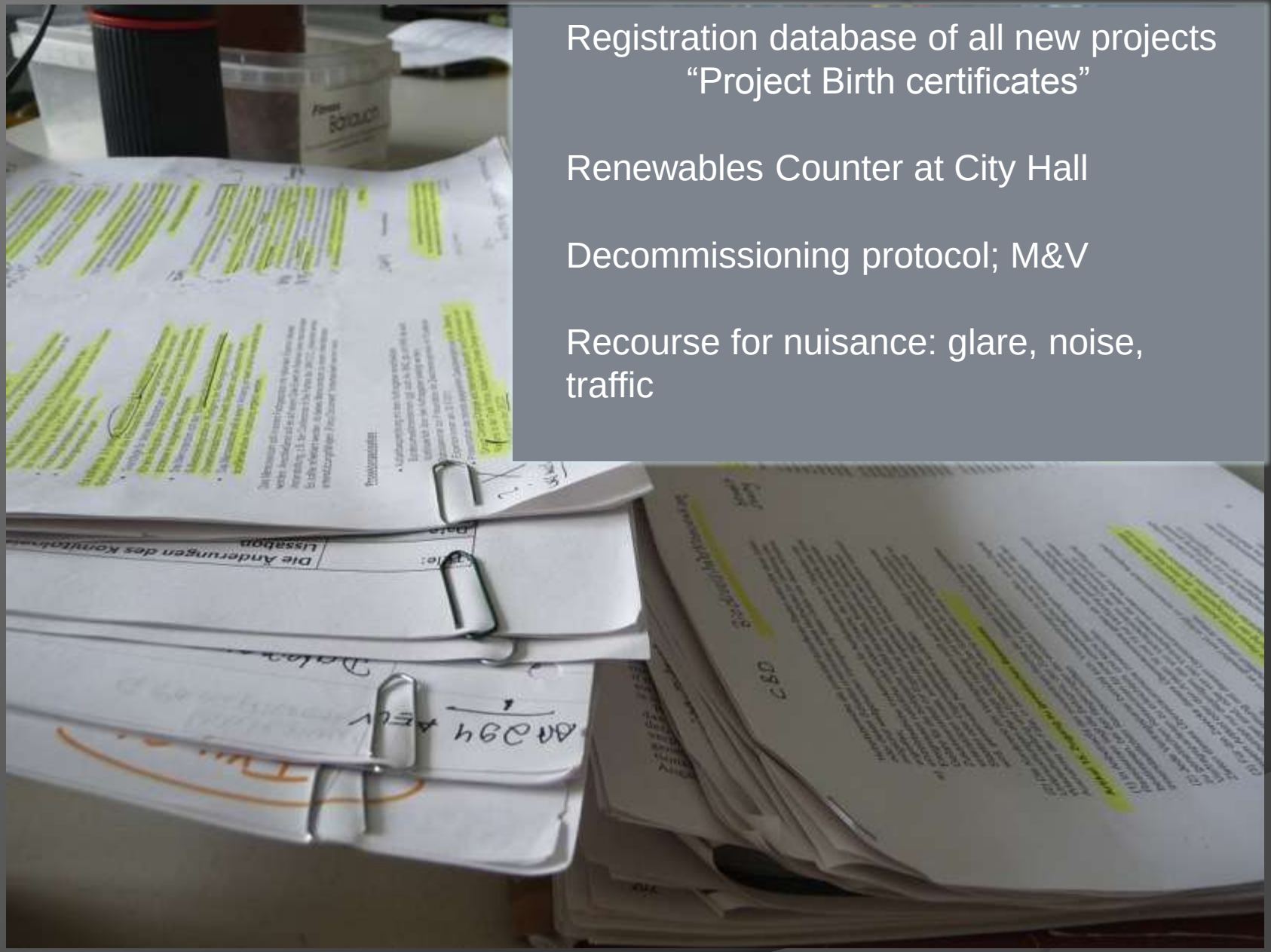
Permitting in Colorado: 2

Some localities have adopted simplified or expedited permitting standards.

Some states have developed model wind ordinances for use by local governments.

The Rooftop Solar Challenge is part of DOE's Sunshot Initiative. A COSEIA-led coalition received a $500,000 grant to reduce permitting and interconnection costs by 25% through online tools, hands-on support, and quantifiable progress assessments.

The team will benchmark its success against established practices and policies.



Registration database of all new projects
"Project Birth certificates"

Renewables Counter at City Hall

Decommissioning protocol; M&V

Recourse for nuisance: glare, noise, traffic

Thesis | Tools | Zoning | Permitting | **Record keeping** | Metering | Taxation & Capitol

Metering on rebated equipment.

Not just commercial systems.

Guarantee that systems are operating and public money well spent.

Reward generation not installation.

Provide “bragging rights” and pride of ownership yield maintenance and upkeep.

Validate contribution of RE

Thank you!

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