



**Pacific
Northwest**
NATIONAL LABORATORY

Can I automate code compliance?



Weili Xu

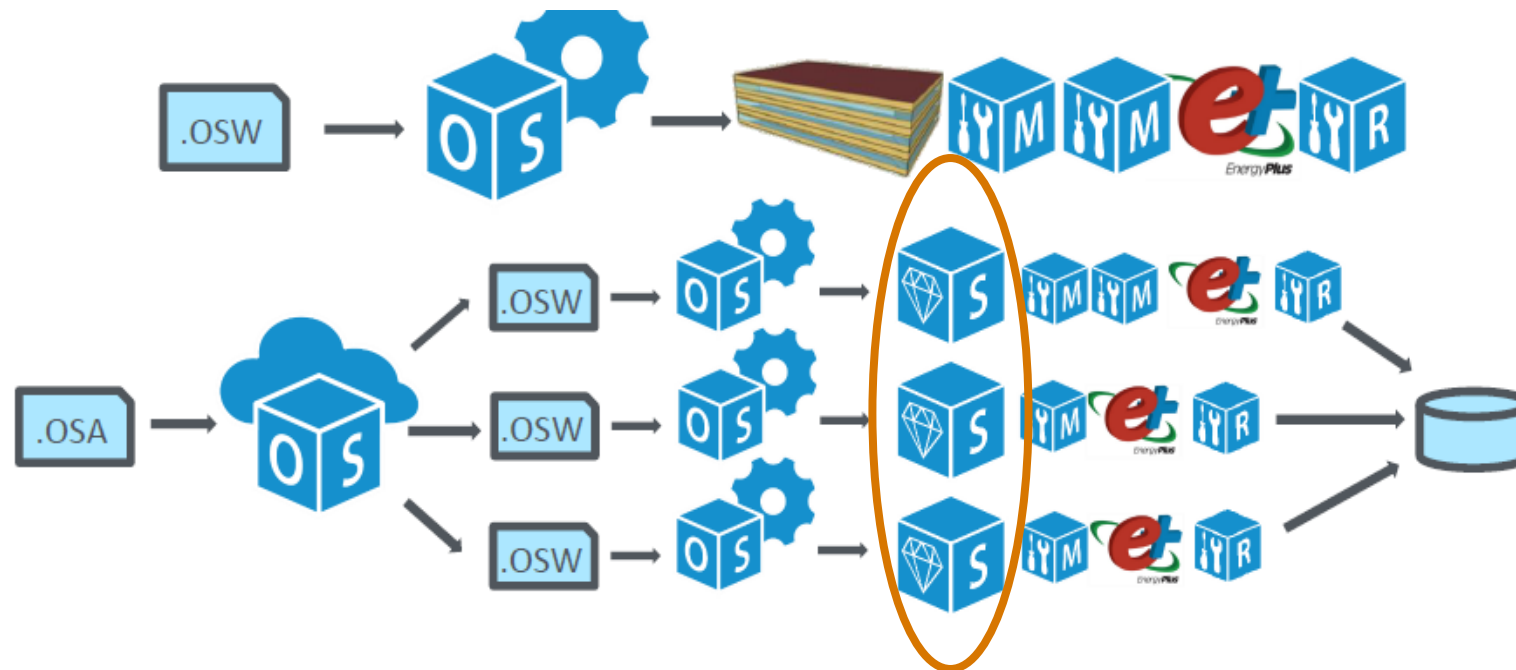
Building energy research engineer
Building Simulation & Design Group
PNNL

U.S. DEPARTMENT OF
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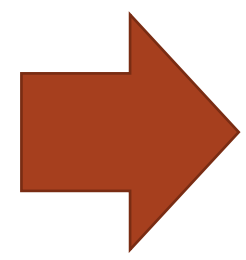
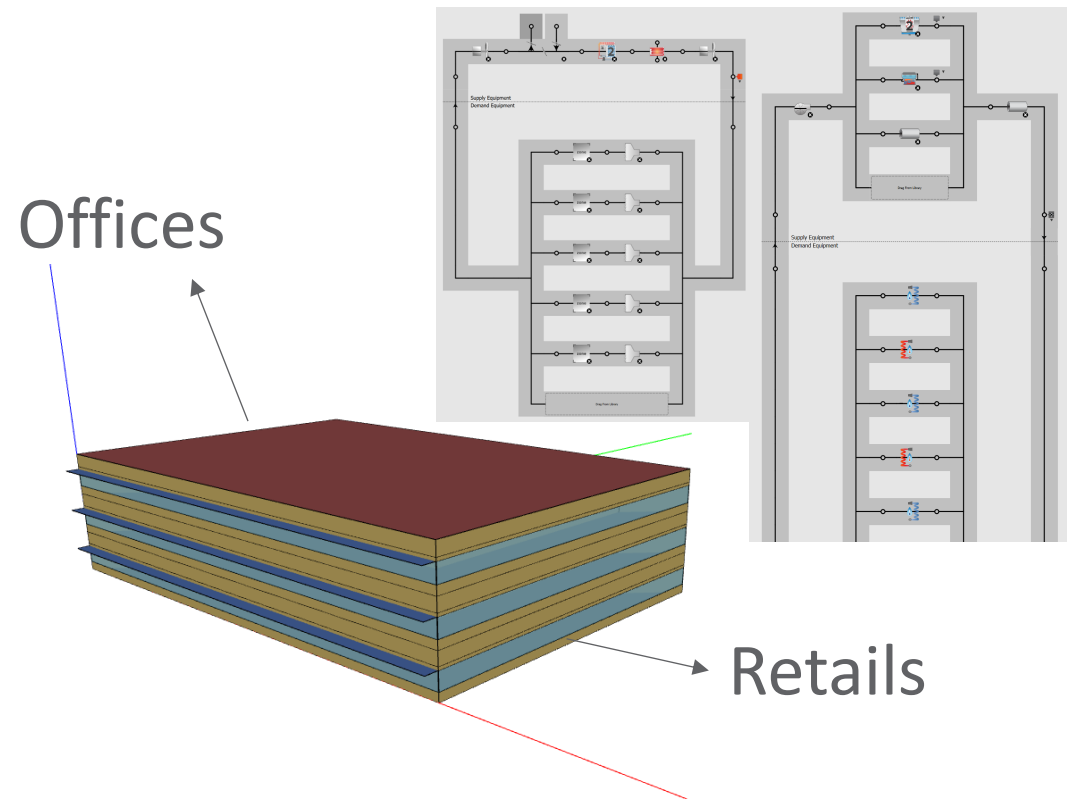


The OpenStudio-Standards Performance Rating Method (OSSTD-PRM) Measure

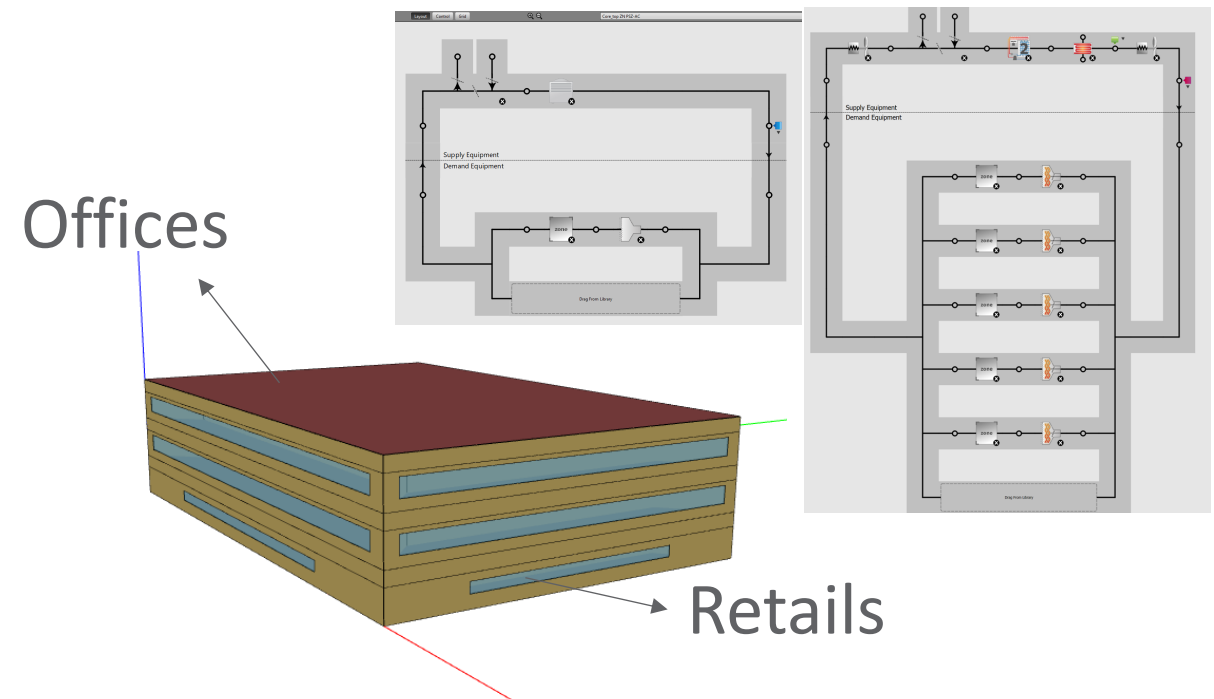


Name	Create ASHRAE 90.1-2019 PRM Model
Description	Create the Baseline Building per ASHRAE Standard 90.1-2019 Performance Rating Method. User manual for this measure please see https://pnnl.github.io/BEM-for-PRM .
Modeler Description	
Inputs	<p>Default Building Area Type for Window To Wall Ratio: Select default building type for WWR assignment based on 90.1 Appendix G table G3.1.1-1.</p> <p>Office <= 5,000 sq ft</p> <p>Default Building Area Type for Service Water Heating: Select default building type for SWH system type assignment based on 90.1 Appendix G table G3.1.1-2.</p> <p>Automotive facility</p> <p>Default Building Type for HVAC: Select default building type for HVAC system type assignment based on 90.1 Appendix G table G3.1.1-3.</p> <p>retail</p> <p>Climate Zone:</p> <p>ASHRAE 169-2013-1A</p> <p>Exempt From Rotations: Select TRUE if the building has rating authority approval that orientation is dictated by site considerations. Note: user data could override this selection.</p> <p>FALSE</p> <p>Exempt From Unmet Load Hours Check: Select TRUE if rating authority has approved allowing the models to exceed the specified values in Appendix G.</p> <p>FALSE</p> <p>Use User Data Project user compliance data.</p> <p>FALSE</p>

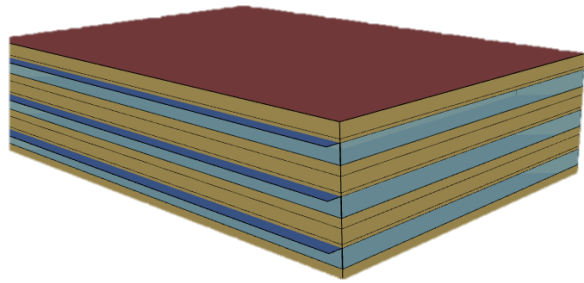
WSHP-DOAS



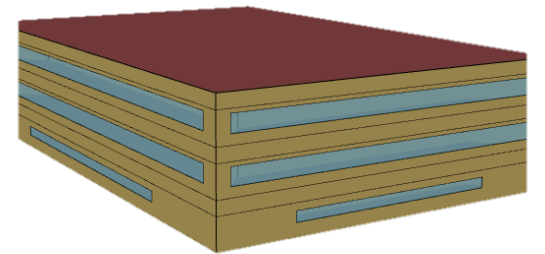
PTAC-Core Top Zone Packaged VAV



Compliance data? Solution - Ask user questions



	A	B
1	name	is_exempted_from_rotation
2	Small Office	FALSE





**Turn unpredictable to
predictable**

**Missing data?
Let users know the issue.**



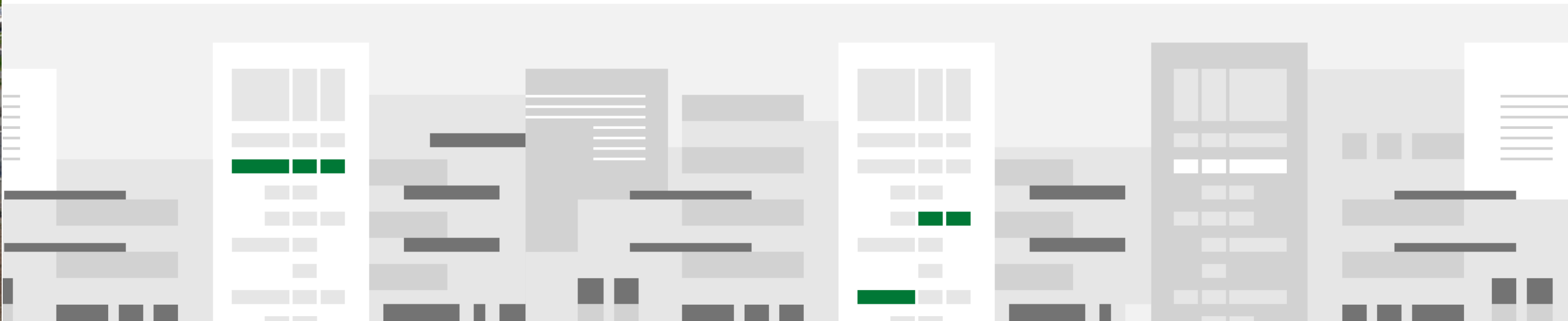
Run Verbose Output

```
:/openstudio_cli.rb:1984:in `<main>'  
eval:188:in `eval'  
eval:188:in `require_embedded_absolute'  
eval:173:in `block in require_embedded'  
eval:167:in `each'  
eval:167:in `require_embedded'  
eval:126:in `require'  
eval:3:in `<main>'  
[10:18:24.800381 ERROR] :/ruby/2.7.0/gems/openstudio-workflow-2.3.1/lib/openstudio/workflow/util/measure.rb failed with message Runner error :/ruby/2.7.0/gems/openstudio-workflow-2.3.1/lib/openstudio/workflow/util/measure.rb failed with Optional not initialized, :/ruby/2.7.0/gems/openstudio-standards-0.4.0/lib/openstudio-standards/standards/ashrae_90_1_prm/ashrae_90_1_prm.SpaceType.rb:444:in `get'  
:/ruby/2.7.0/gems/openstudio-standards-0.4.0/lib/openstudio-standards/standards/ashrae_90_1_prm/ashrae_90_1_prm.SpaceType.rb:444:in `block in space_type_light_sch_change'  
:/ruby/2.7.0/gems/openstudio-standards-0.4.0/lib/openstudio-standards/standards/ashrae_90_1_prm/ashrae_90_1_prm.SpaceType.rb:443:in `each'  
:/ruby/2.7.0/gems/openstudio-standards-0.4.0/lib/openstudio-standards/standards/ashrae_90_1_prm/ashrae_90_1_prm.SpaceType.rb:443:in `space_type_light_sch_change'  
:/ruby/2.7.0/gems/openstudio-standards-0.4.0/lib/openstudio-standards/standards/Standards.Model.rb:180:in `block in model_create_prm_any_baseline_building'  
:/ruby/2.7.0/gems/openstudio-standards-0.4.0/lib/openstudio-standards/standards/Standards.Model.rb:93:in `each'  
:/ruby/2.7.0/gems/openstudio-standards-0.4.0/lib/openstudio-standards/standards/Standards.Model.rb:93:in `model_create_prm_any_baseline_building'  
C:/Users/xuwe123/AppData/Local/Temp/osmodel-1695834816-40/resources/asures/CreateBaselineBuilding/measure.rb:348:in `run'  
:/ruby/2.7.0/gems/openstudio-workflow-2.3.1/lib/openstudio/workflow/util/measure.rb:517:in `apply_measure'  
:/ruby/2.7.0/gems/openstudio-workflow-2.3.1/lib/openstudio/workflow/util/measure.rb:114:in `block in apply_measures'  
:/ruby/2.7.0/gems/openstudio-workflow-2.3.1/lib/openstudio/workflow/util/measure.rb:67:in `each_index'  
:/ruby/2.7.0/gems/openstudio-workflow-2.3.1/lib/openstudio/workflow/util/measure.rb:67:in `apply_measures'  
:/ruby/2.7.0/gems/openstudio-workflow-2.3.1/lib/openstudio/workflow/jobs/run_os_measures.rb:70:in `perform'  
:/ruby/2.7.0/gems/openstudio-workflow-2.3.1/lib/openstudio/workflow/run.rb:291:in `step'  
:/ruby/2.7.0/gems/openstudio-workflow-2.3.1/lib/openstudio/workflow/run.rb:233:in `run'  
:/openstudio_cli.rb:1187:in `execute'  
:/openstudio_cli.rb:817:in `execute'  
:/openstudio_cli.rb:1984:in `<main>'  
eval:188:in `eval'  
eval:188:in `require_embedded_absolute'  
eval:173:in `block in require_embedded'  
eval:167:in `each'  
eval:167:in `require_embedded'  
eval:126:in `require'  
eval:3:in `<main>' in :/ruby/2.7.0/gems/openstudio-workflow-2.3.1/lib/openstudio/workflow/util/measure.rb:545:in `rescue in apply_measure'  
:/ruby/2.7.0/gems/openstudio-workflow-2.3.1/lib/openstudio/workflow/util/measure.rb:505:in `apply_measure'  
:/ruby/2.7.0/gems/openstudio-workflow-2.3.1/lib/openstudio/workflow/util/measure.rb:114:in `block in apply_measures'  
:/ruby/2.7.0/gems/openstudio-workflow-2.3.1/lib/openstudio/workflow/util/measure.rb:67:in `each_index'  
:/ruby/2.7.0/gems/openstudio-workflow-2.3.1/lib/openstudio/workflow/util/measure.rb:67:in `apply_measures'  
:/ruby/2.7.0/gems/openstudio-workflow-2.3.1/lib/openstudio/workflow/jobs/run_os_measures.rb:70:in `perform'  
:/ruby/2.7.0/gems/openstudio-workflow-2.3.1/lib/openstudio/workflow/run.rb:291:in `step'  
:/ruby/2.7.0/gems/openstudio-workflow-2.3.1/lib/openstudio/workflow/run.rb:233:in `run'  
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eval:188:in `eval'  
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eval:167:in `each'  
eval:167:in `require_embedded'
```

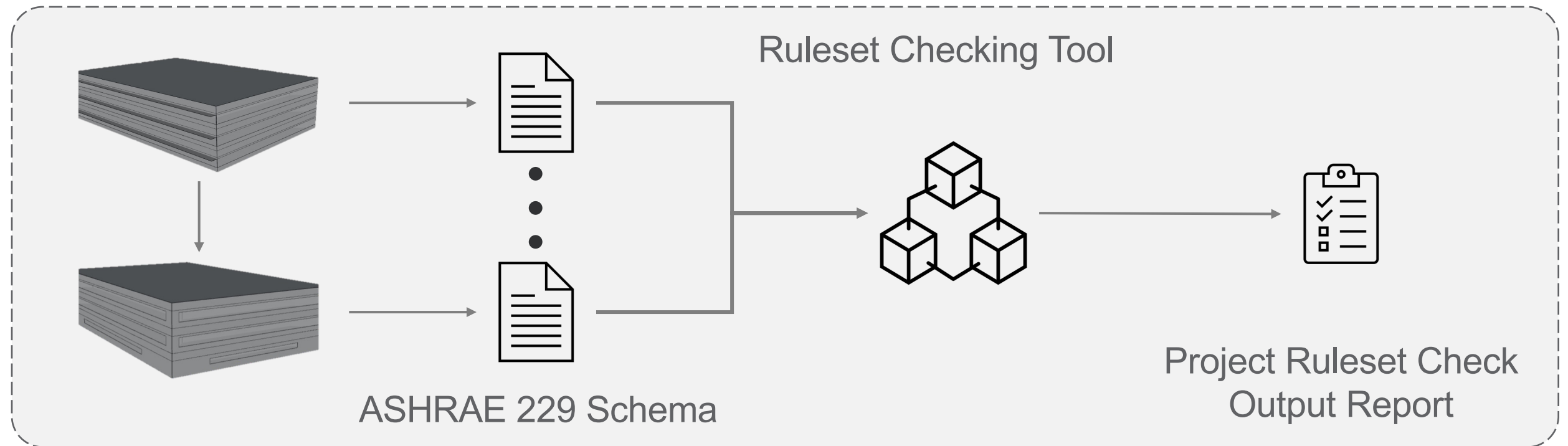
User energy models do not have standard space type assigned to a space.

**The path to the success is paved with
the feedbacks and support of users.**

OSSTD-PRM measure is going to release in November



Can I automate code compliance?





**Pacific
Northwest**
NATIONAL LABORATORY

Thank you

Feedbacks?

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