[Antipodes Map - Tunnel to the other side of the world]

Your Location *29, Middelthuns gate, Frogner, Oslo, 0368, Norge*

— Coordinates: 59.929446, 10.707529 (59° 55' 46" N, 10° 42' 27.1" E)

Antipodes Location *Thousands have lived without love. Not one without water. - W. H. Auden*

— Coordinates: -59.929446, -169.292471 (59° 55' 46" S, 169° 17' 32.9" W)

NVE

Antipode JuMPing

How Norwegian authorities can use JADE.jl for better decision making?

Presentation based on joint work with Harald Endresen and other colleagues

Jarand Hole

Senior Engineer, NVE

Edinburgh, 31.05.2026

NTRANS
Norwegian Centre for Energy Transition Strategies


NVE
My two reasons:
Learn
Inspire
Photo: NVE

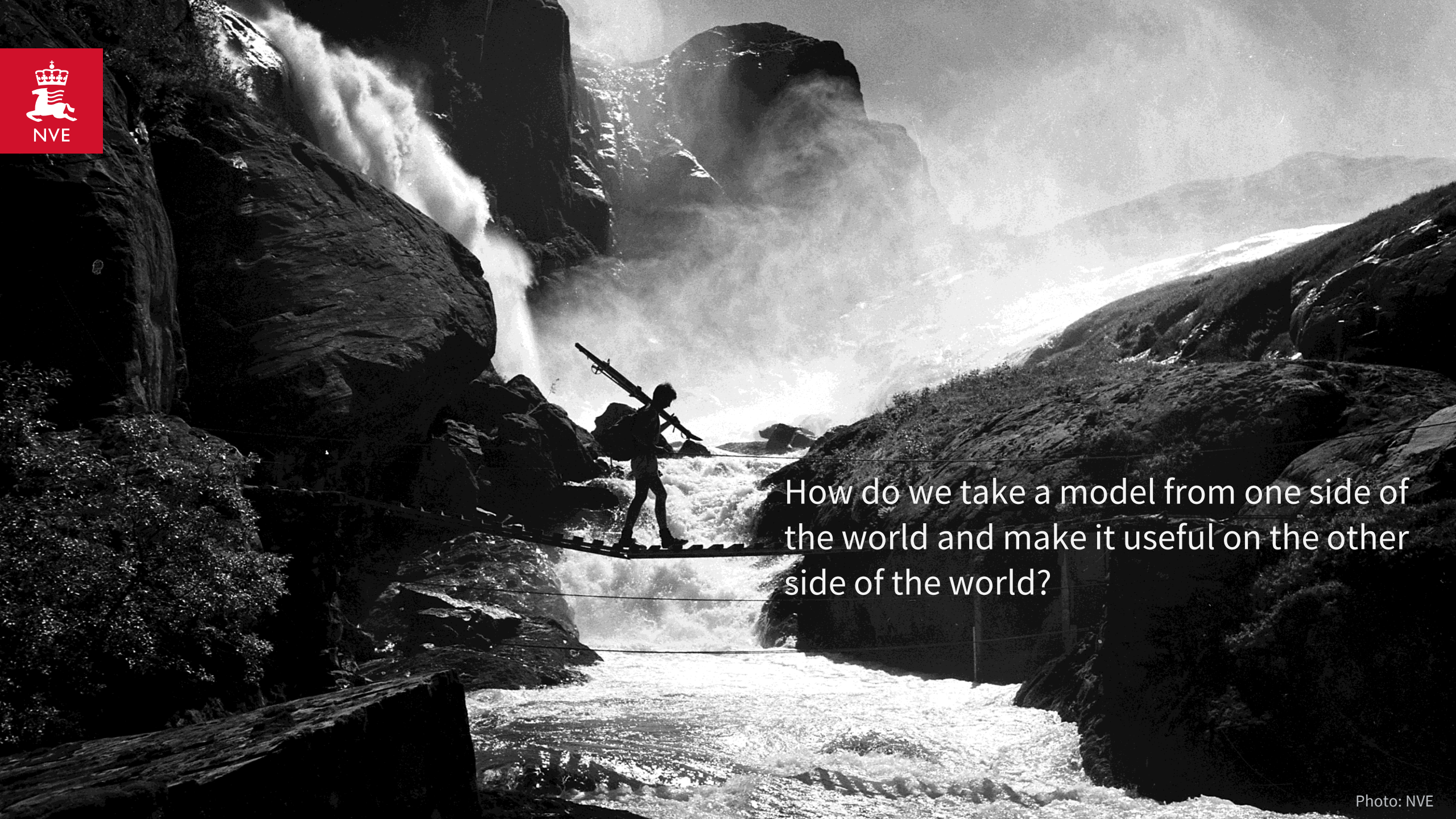
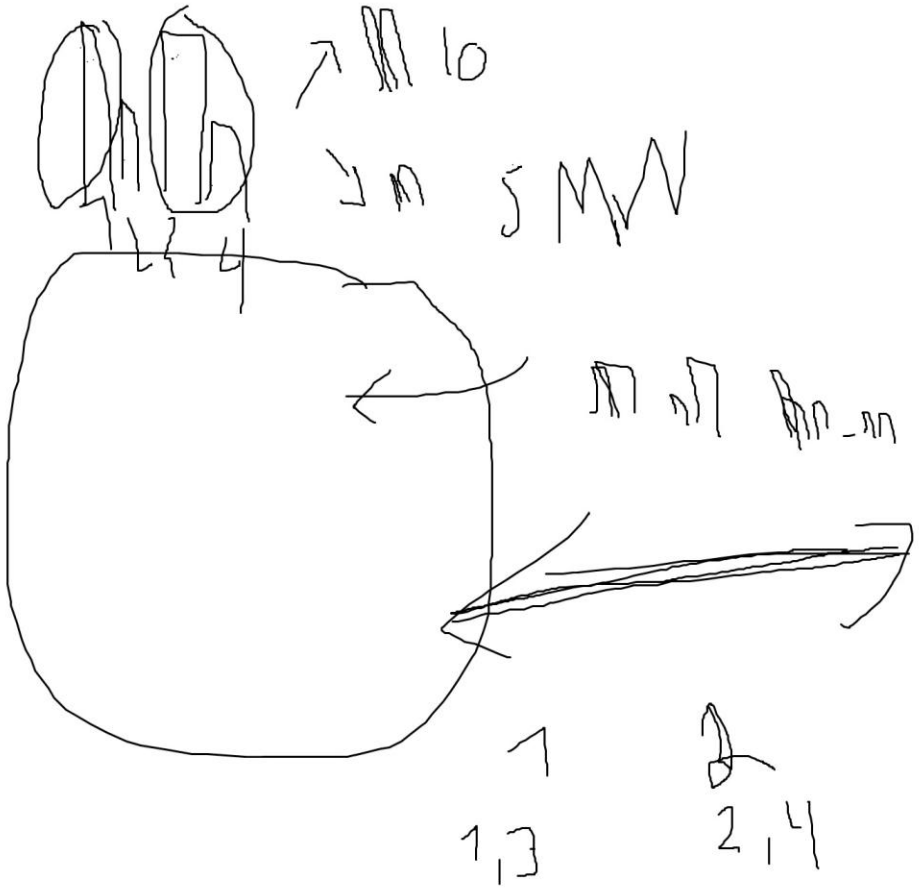
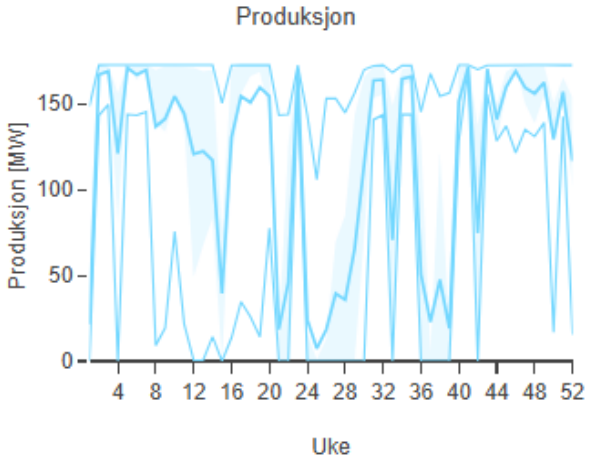

How do we take a model from one side of the world and make it useful on the other side of the world?

Photo: NVE



(live demo)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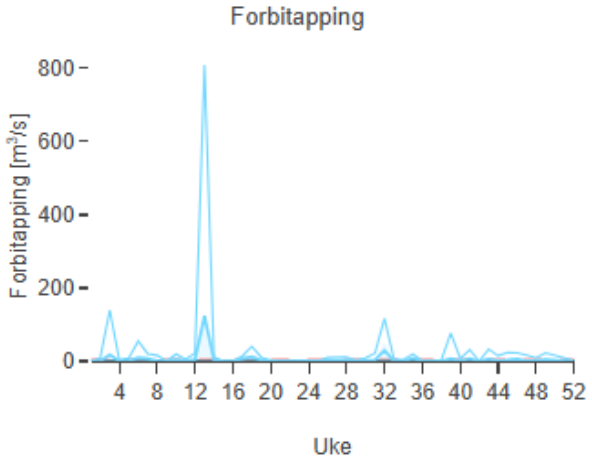
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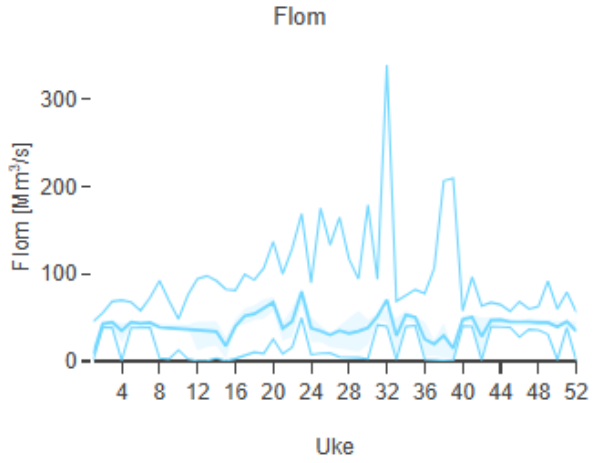
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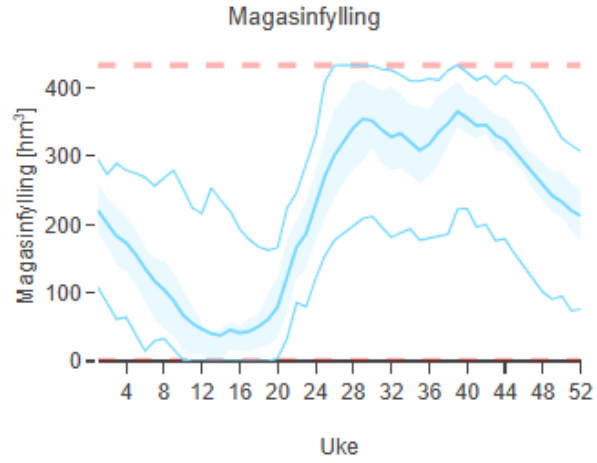
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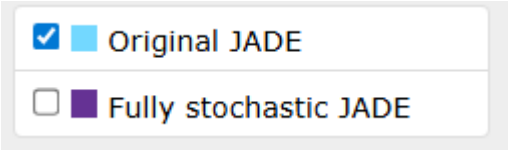
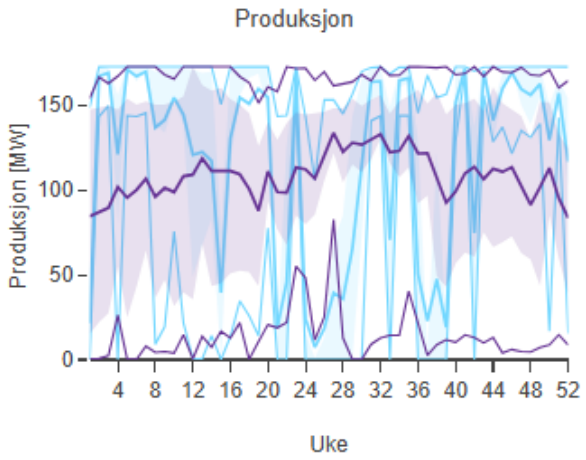

Original JADE
Fully stochastic JADE

(live demo)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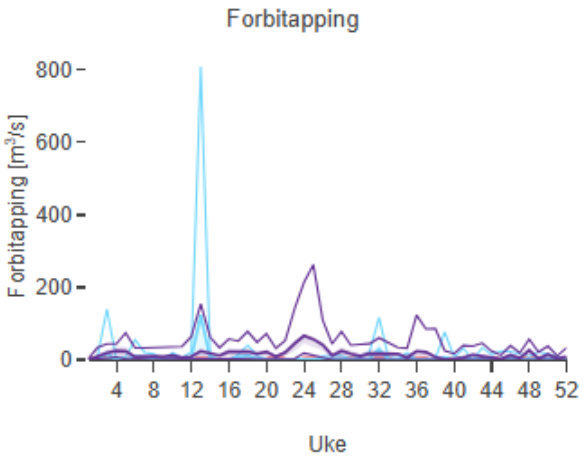
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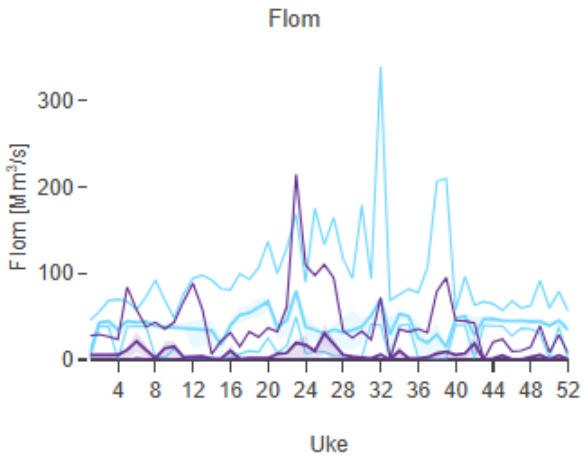
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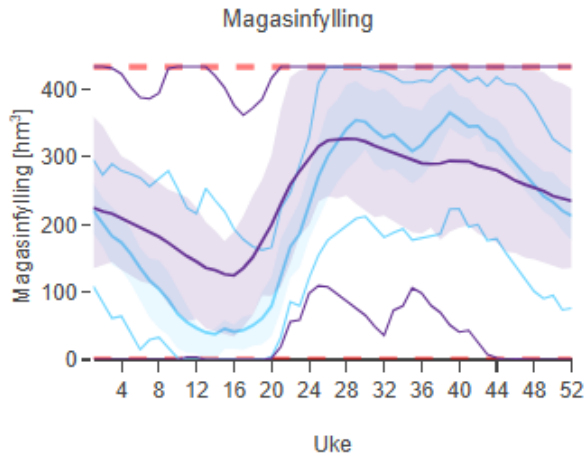
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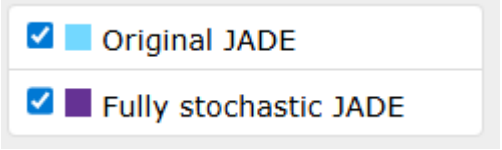

Original JADE
Fully stochastic JADE

NVE

ParametricOptInterface.jl

src/model.jl +6 -1

```
+            # Fuel cost as parameter
+            fuel_costs[f in s.THERMALS] in JuMP.MOI.Parameter(1.0)
             end
             )

@@ -492,6 +494,9 @@ function JADEsddp(d::JADEData, optimizer = nothing)
                     JuMP.set_parameter_value(demand[n, bl], d.demand[TimePoint(j, timenow.week)][(n, bl)])
                 end
             end
+            for t in s.THERMALS
+                JuMP.set_parameter_value(fuel_costs[t], d.fuel_costs[TimePoint(j, timenow.week)][d.thermal_stations[t].fuel])
+            end
         end

         #SDDP.parameterize(md, inflow_uncertainty) do φ

@@ -617,7 +622,7 @@ function JADEsddp(d::JADEData, optimizer = nothing)
             md,
             immediate_cost,
             sum(
-                (station.omcost + d.fuel_costs[timenow][station.fuel] * station.heatrate) *
+                (station.omcost + fuel_costs[station] * station.heatrate) *
```

Conflicts

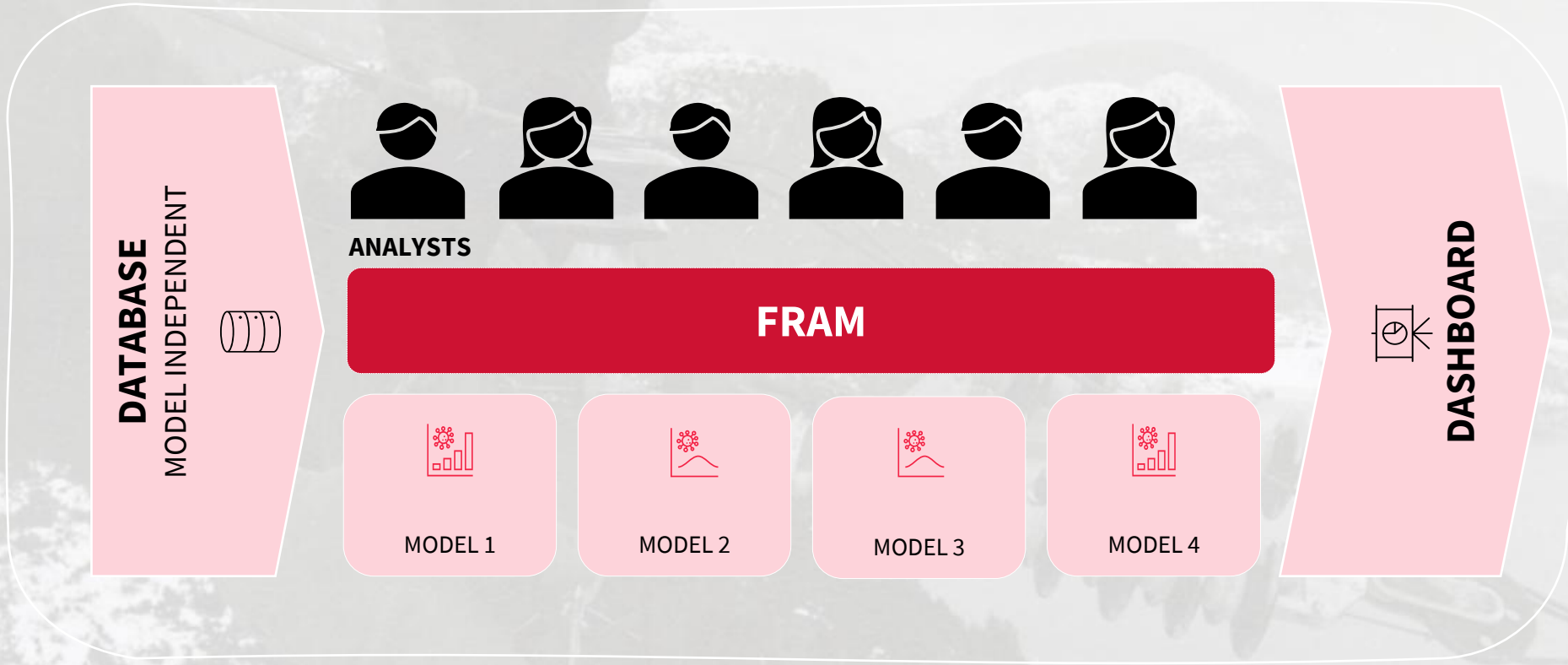
When the model you input is infeasible, some solvers can help you find the cause of this infeasibility by offering a conflict, that is, a subset of the constraints that create this infeasibility. Depending on the solver, this can also be called an IIS (irreducible inconsistent subsystem).

If supported by the solver, use `compute_conflict!` to trigger the computation of a conflict. Once this process is finished, query the `MOI.ConflictStatus` attribute to check if a conflict was found.

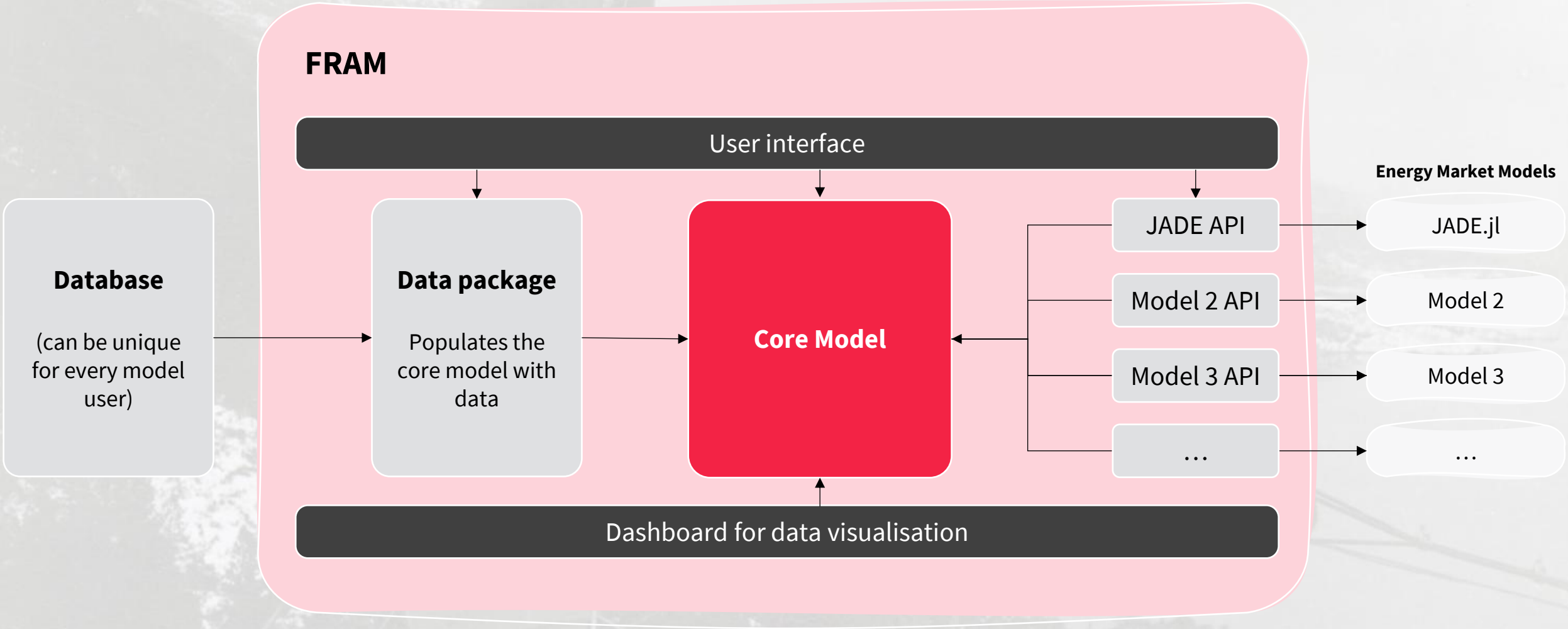
If found, copy the IIS to a new model using `copy_conflict`, which you can then print or write to a file for easier debugging:

```
julia> using JuMP

julia> import HiGHS

julia> model = Model(HiGHS.Optimizer);

julia> set_silent(model)

julia> @variable(model, x)
x

julia> @constraint(model, c1, x >= 2)
c1 : x ≥ 2.0

julia> @constraint(model, c2, x <= 1)
c2 : x ≤ 1.0

julia> optimize!(model)

julia> compute_conflict!(model)

julia> if get_attribute(model, MOI.ConflictStatus()) == MOI.CONFLICT_FOUND
           iis_model, _ = copy_conflict(model)
           print(iis_model)
       end
```

FRAM is an open-source modelling framework developed by NVE



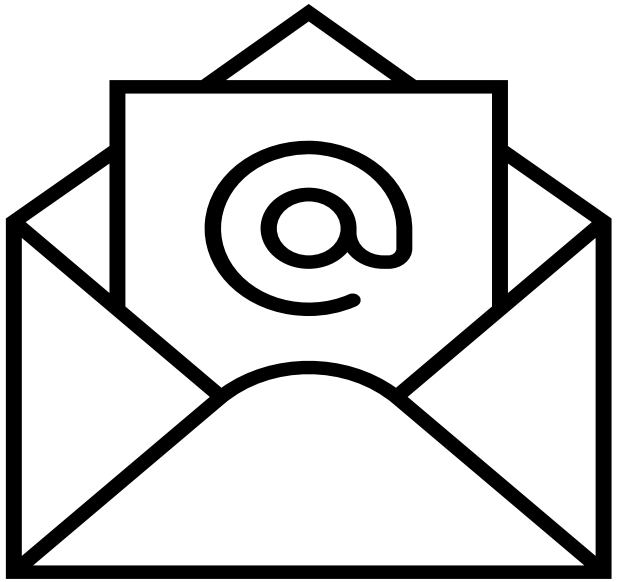
What is FRAM? - FRAM - NVE's Open-Source Power Market Modelling Framework



What is FRAM? - FRAM - NVE's Open-Source Power Market Modelling Framework

Feel free to check out NVEs modelling framework FRAM

VISIT OUR WEBPAGE
nve/github.io/fram/



SEND US AN EMAIL
fram@nve.no